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ABSTRACT

This study, presented in three parts, investigated the effects of a group of single-concept instructional variables on the learning at an advanced level of attainment of taxonomy of behavior management concepts. The effects of presenting advance organizers and inserting within-text questions was also examined. The influence of the single-concept instructional variables, advance organizers, and within-test questions on the understanding of supraordinate-coordinate-subordinate relationships among the concepts within the taxonomy and in the recognition of the position of each concept within the taxonomy was also investigated. Subjects were 208 twelfth-grade students. Subject read a series of three written instructional or placebo lessons on three successive days. Several versions of the lessons were prepared in which the instructional variables of interest were systematically varied. The potential differential effectiveness of the instructional lessons constituted the experimental focus of concern. Single concept instructional variables resulted in a significant amount of learning across the three assessment measures in comparison with a condition of no instruction. A main effect of advance organizer and within-text questioning was found across each of the three assessment measures. It was hypothesized that advance organizers permitted subjects to sort the diverse and related information presented in the instructional lessons into separate categories. (Author)

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TECHNICAL REPORT NO. 357

the effects of advance organizers and within-text questions on the learning of a taxonomy of concepts

DECEMBER 1975

WISCONSIN RESEARCH
AND DEVELOPMENT
CENTER FOR
COGNITIVE LEARNING

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Technical Report No. 357

THE EFFECTS OF ADVANCE ORGANIZERS AND WITHIN-TEXT QUESTIONS ON THE LEARNING OF A TAXONOMY OF CONCEPTS

by

Michael Edwin Bernard

Report from the Project on
Conditions of School Learning and
Instructional Strategies

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The Wisconsin R&D Center is supported with funds from the National Institute of Education; the Bureau of Education for the Handicapped, U.S. Office of Education; and the University of Wisconsin.

DEDICATION

To Dad

In recognitition of all the love and support you have provided me over the years.

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ABSTRACT

The present study investigated the effects of a group of single-concept instructional variables on the learning at an advanced level of attainment of a taxonomy of behavior management concepts. The effects of presenting advance organizers and inserting within-text questions was also examined. The influence of the single-concept instructional variables, advance organizers, and within-text questions on the understanding of supraordinate-coordinate-subordinate relationships among the concepts within the taxonomy and in the recognitition of the position of each concept within the taxonomy was also investigated.

Subjects were 208 twelfth-grade students. Subjects read a series of three written instructional or placebo lessons on three successive days. Several versions of the lessons were prepared in which the instructional variables of interest were systematically varied. The potential differential effectiveness of the instructional lessons constituted the experimental focus of concern. Mastery of the eight concepts represented in the taxonomy, understanding of supraordinate-coordinate-subordinate relationships, and recognitition of the level of each concept in the taxonomy were assessed on three separate measures which were administered on the fourth day of the experiment.

Single concept instructional variables resulted in a significant amount of learning across the three assessment measures in comparison with a condition of no instruction.

A main effect of advance organizer and within-text questioning was found across each of the three assessment measures. It was hypothesized that advance organizers permitted subjects to sort the diverse and related information presented in the instructional lessons into separate categories. The distinctive meaning of the concepts and relevant attributes was purported to result from the organizational knowledge acquired from the organizers. Within-text questions were thought to either elicit a mathemagenic learning strategy or serve as a rehearsal exercise in promoting increased learning.

Chapter I

INTRODUCTION

Concept learning has long been recognized as a fundamental form of school-related learning. Scholars in a variety of disciplines have identified concepts as a basic unit of instruction. A vast number of studies have been conducted which examine variables that facilitate the attainment of concepts (Clark, 1970). A majority of experimentation has been conducted in tightly controlled laboratory settings (e.g., Bourne, 1957, 1963; Dietz, 1955; Grant, 1951; Haygood & Stevenson, 1967). While such studies have uncovered certain learner, instructional, and concept characteristics that contribute to successful concept learning, the generalizability of these findings to classroom settings remains uncertain. The external validity of this research when applied to classroom settings has not been empirically demonstrated and cannot be assumed to be appropriate.

More recently, attention has been directed at the identification of instructional variables that are relevant to the teaching of subject-matter concepts in the classroom (e.g., Klausmeier & Feldman, 1973; Markle & Tiemann, 1969; McMurray, 1973; McMurray, Bernard, & Klausmeier, 1974; Tennyson, Woolley, & Merrill, 1972; Woodson, 1974).

Specifically, the use of a definition, attribute definition, attribute prompting, a rational set of concept examples and non-examples, divergent examples, and convergent pairing of an example and non-example, has shown to promote the learning of subject-matter concepts. These studies appear to hold the greatest promise and interest for educators concerned with the improvement of instructional materials and procedures that are used in the schools.

Studies that have examined the learning of subject-matter concepts have typically focused on the attainment of single concepts as the terminal learning objective. The external validity of research on concept learning and instructional techniques requires, however, the teaching of concepts as they might be presented or organized in a curriculum sequence. Concepts are not commonly taught in the classroom as separate entities. Instruction in different subject-matter areas involves the presentation of groups of related concepts.

Klausmeier, Ghatala & Frayer (1974a), Feldman (1974) and Bernard (in press) have indicated two general types of relationships among concepts that are taught in the classroom as part of the curriculum. The first are principles which are statements of relationships among concepts that provide a basis for reasoning or a guide for conduct or procedure. A limited number of investigators have experimentally examined the learning of principles (e.g., Anderson, 1973; Feldman, 1974: Gagné, Mayor, Garstens, & Paradise, 1962; Gagné & Bassler, 1963; Gibson, 1970; Traub, 1966; Watts &

Anderson, 1971). A second type of relationship among concepts is that represented in a taxonomy of concepts. A taxonomy of concepts is a way of representing and relating a group of concepts on the basis of their exclusiveness, inclusiveness, and their defining attributes.

Klausmeier's et al. (1974a) work suggests the following four relationships that exist within a taxonomy of concepts. These taxonomic relationships are: a) Some but not all members of a supraordinate class belong to a given subclass, b) All members of a subclass are also members of a higher class, c) The sum of the members of the subclasses equals the sum of the members of the supraordinate class, and d) The members of one coordinate class are not members of another coordinate class. Additionally, Klausmeier's et al. work (1974b, 1974c) has empirically demonstrated that the level of attainment of concepts in a taxonomy is positively correlated with understanding of taxonomic relationships.

While research has shown developmental differences in the understanding of the relationships among concepts that exist in a taxonomy of concepts (Klausmeier, Sipple & Allen, 1974b, 1974c), little or no direct experimentation dealing with the learning of a taxonomy of concepts has apparently been conducted. The present study examines instructional variables that contribute to the learning of a group of concepts organized in a taxonomy.

An extensive amount of research has been conducted in the area of meaningful learning of prose material (e.g., Ausubel, 1960; Frase, 1970; Rothkopf, 1966). It would appear that since concepts are basic constituents of prose material, principles of prose learning instruction ought to be generalizable to the teaching of subject-matter concepts.

The work of Ausubel and others (e.g., Ausubel, 1968; Ausubel, Robbins, & Blake, 1957; Ausubel & Robinson, 1968) has strongly suggested that when a learner is presented with material prior to learning that contains ideas related to and more inclusive than ideas to be taught in subsequent instructional material (advance organizer), the learning of the material is enhanced. Ausubel has theorized that an advance organizer provides the learner with a set of anchoring ideas which aid the learner in the initial discrimination of new ideas, differentiation of new ideas from non-existent or established meanings within the learner's cognitive structure, and in the recall of the newly encountered ideas.

Rothkopf (1965) has formulated a theory of <u>mathemagenic behavior</u> in which the efficiency of learning is tied causally to those activities that the learner engages in during instruction (mathemagenic behaviors). Rothkopf (e.g., Rothkopf, 1966; Rothkopf & Bisbicos, 1967; Rothkopf & Billington, 1974), Frase (1967, 1968a, 1968b) and others have studied the effects of inserting questions in prose passages on the learning and retention of prose material.

Rothkopf suggests that within-text questioning of material encourages the adoption of certain mathemagenic behaviors by the learner which facilitate learning.

While it is unclear as to which specific internal mental processes (i.e., memory rehearsal, increased attention) are triggered through the insertion of questions in written matter, the conclusion of an impressive number of studies is that within-text questioning has a positive effect on the learning of prose material especially when the questions are placed after prose passages.

Klausmeier et al., (1974a), indicate that the learning of the same concept by an individual occurs at four successively higher and more complex levels of attainment. Each level of attainment is distinguished by cognitive operations that are prerequisites for the attainment of a concept at a particular level. Each successive level is marked by the emergence of a new and more complex operation. The cognitive operations that are necessary for attaining a concept at the two highest levels (Classificatory and Formal) are: a) generalizing that two or more examples of a concept are members of the same class, b) discriminating the relevant and irrelevant attributes of the concept, c) differentiating between examples and non-examples of concepts in terms of defining attributes, d) labelling of relevant attributes of the concept, and e) inferring the concept. The instructional lessons used in this study were directed at the facilitation of these operations in the context of teaching a taxonomy of behavior management concepts. Assessment exercises were also based in part on the subject's ability to perform these operations.

PURPOSES AND HYPOTHESES

This study had essentially three basic objectives. The first was to determine whether instructional variables that have been found effective in teaching single, subject-matter concepts (single-concept instructional variables), would promote the acquisition at the Formal level of attainment of each of a group of concepts organized in a taxonomy. The eight target teaching concepts are represented in a taxonomy of behavior management procedures presented on page 69 .

The second objective was to determine whether adding advance organizers and within-text questions to a lesson containing single-concept instructional variables would affect the learning of concepts organized in a taxonomy. Two levels of advance organizer were studied: presence or absence. Two types of within-text questions were of concern. Attribute prompting questions directed the learner's attention to the presence or absence of the relevant attributes of the behavior management concepts. Attribute prompting questions asked the learner to determine whether each relevant attribute of a concept was present in a teaching example before deciding whether the teaching example was an example of the target behavior management concept. Relational questions asked the learner about relationships that exist within the taxonomy of behavior management concepts (taxonomic relationships). Both kinds of questions were presented following the relevant instructional material.

A third objective of the study was to determine the effects of single-concept instructional variables, advance organizers, and

within-text questions on both the learner's understanding of the four taxonomic relationships and knowledge of the relative position of each concept within the taxonomy. The relationship of attainment of the individual concepts to the understanding of taxonomic relationships and knowledge of the taxonomic position of each concept was also examined.

It was hypothesized that single-concept instructional variables would promote the attainment of each concept in comparison to a condition of no instruction. Since the work of Feldman (1972), Frayer (1970), Klausmeier and Feldman (1975), Markle and Tiemann (1972), Merrill and Tennyson (1971a, 1971b), Tennyson, Woolley and Merrill (1972) and others has demonstrated that a definition, attribute definition, attribute prompting, rational set, and a concept set are effective variables in concept instruction, it was felt that these same variables would promote the attainment of a group of related behavior management concepts.

Advance organizers when presented along with single-concept instruction were hypothesized to facilitate the learning of the concepts, understanding of the taxonomic relationships, and knowing the taxonomic position of each concept in comparision with a condition of no advance organizer instruction. An advance organizer is a set of inclusive and general ideas that provide the learner with a meaningful and organizational context prior to the learning of new ideas (Ausubel, 1963). The clarity, stability and generality of ideas presented in an advance organizer which are incorporated into

cognitive structure makes possible the meaningful learning of new ideas. It was felt that in the process of learning about a group of highly related concepts that are organized in a taxonomic fashion, an advance organizer would enable the learner to initially discriminate important properties of each concept, and maintain and recall the distinctive meanings of each concept over time.

Questions inserted within the single-concept instructional material were predicted to increase the level of attainment of each concept, the understanding of the taxonomic relationships, and knowledge of the position of each concept within the taxonomy. Frase (1967, 1968a, 1968b), Rothkopf (1965) and others have demonstrated that post-questions can facilitate the recall of information contained in post-questioned prose passages. Regardless of whether post-questions promote increased attention to material that immediately follows, or serve as a rehearsal strategy for the assimilation of previously learned ideas, it was felt that post-questions would have a similar positive effect on the learning of material designed to teach concepts.

It was also hypothesized that the level of attainment of the concepts would be positively related to the learner's understanding of the taxonomic relationships among the concepts and recognition of the taxonomic position of each concept. Such a prediction is consistent with the findings of Klausmeier, Sipple, and Allen (1974b, 1974c) that suggest that acquiring a concept at an advanced level of attainment permits the individual to use the concept in cognizing supraordinate-coordinate-subordinate relationships that exist within a taxonomy of concepts.

METHOD

Subjects were 208 twelfth-grade high school students drawn from 10 classrooms in four midwestern high schools. Subjects in each classroom were randomly assigned to one of eight treatment groups. Six of the eight groups were represented in a 2 x 3 factorial design having two levels of advance organizers (present and absent) and three levels of within-text questions (attribute prompting, relational, and no questions). A seventh group participated in a no advance organizers and no question condition. An eighth control group received placebo material. The performance of the seventh and eighth groups were compared apart from the other six groups (see page 93).

Three instructional lessons dealing with the different behavior management concepts were developed. All of these instructional lessons contained, at a minimum, material incorporating the single-concept instructional variables. The independent variables of advance organizers and within-text questions were systematically varied across and incorporated within the instructional lessons according to the requirements of the design. Where present, a different advance organizer preceded each of the three instructional lessons. Three placebo lessons dealing with non-related psychological material were also identified.

The study was conducted over four consecutive days. Each subject read the three lessons on three successive days. On the fourth day, all subjects received three different multiple-choice tests. The first test assessed mastery of each of the concepts. The second assessed understanding of the taxonomic relationships among the

concepts. The third determined whether subjects could identify the position of each concept within the taxonomy.

The effects of the single-concept instructional variables relative to the condition of no instruction was examined through several t-tests. Two-way analyses of variances were performed in determining the effects of advance organizers and within-text questions. In determining the relationship between concept mastery, the understanding of taxonomic relationships, and knowledge of the taxonomic position of each concept, correlation coefficients were computed.

SIGNIFICANCE OF STUDY

The determination of the instructional conditions necessary for the attainment of a taxonomy of concepts should be of interest to educators concerned with the development of teaching materials. During the past decade, a plethora of data has accumulated concerning conditions of concept learning (e.g., Clark, 1970). The present study asks whether it is necessary to insert questions into concept teaching materials and to construct advance organizers when teaching related concepts of varying levels of abstractness and inclusiveness. Are single-concept instructional variables sufficient for the mastery of each of a group of concepts organized in a taxonomy? Are single-concept instructional variables sufficient for the understanding of relationships that exist within the taxonomy of concepts?

CHAPTER II

REVIEW OF RELATED LITERATURE

The Nature of a Taxonomy of Concepts

Many concepts can be represented in a taxonomy. A taxonomy of concepts systematically distinguishes, orders, and names groups of concepts which, in many instances, exist within a subject-matter field (Bernard, in press). Groups of concepts that are related on the basis of their inclusiveness, exclusiveness and defining attributes can be classified and represented in a taxonomy. That is, certain concepts are related to one another on the basis that they share one or more common defining attributes. In a taxonomy of concepts, the relationships among concepts that share at least one defining attribute are depicted. Klausmeier et al., (1974a) and Sipple (in press) have indicated three basic kinds of inclusive-exclusive classes of concepts that are represented in a taxonomy of concepts: supraordinate, coordinate, and subordinate.

> A supraordinate concept has fewer defining attributes than those lower in the taxonomy because the lower concepts are distinguished from each other in terms of one or more defining attributes not used in defining the supraordinate concept.
>
> Concepts that are coordinate in a taxonomy or are at the same level of specificity are those that share only the same defining attributes of their supraordinate concept.

> Concepts subordinate to or below a given concept in a taxonomy share all of the defining attributes with the given concept, but require at least one additional attribute to define them (Tipple, p. 5-6).

Tree diagrams are commonly employed to represent a taxonomy of concepts. Figure 1 presents a partial taxonomy of concepts that exists in the field of mathematics. The concepts are ordered and distinguished on the basis of their generality and defining attributes. It can be seen that concepts that are high within the taxonomy have fewer defining attributes yet subsume the larger number of subsets of concepts. For example, polygon is defined in terms of three attributes (plane, closed, and simple figure) and is the most general subsumptive concept. Triangle and right triangle are defined by a progressively greater number of attributes, yet are successively less subsumptive.

Bernard (in press) has provided a detailed account of a taxonomy of concepts.

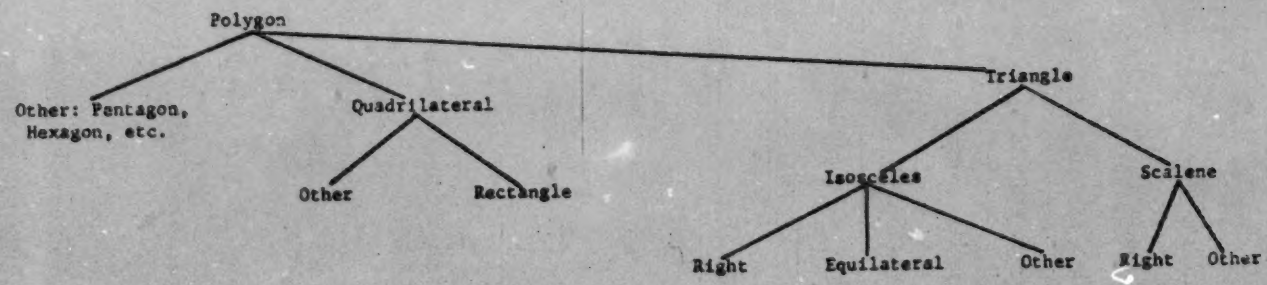
> Concept taxonomies can vary in the extent to which experts agree on how concepts should be organized within a particular taxonomy and whether a particular concept can be represented in a taxonomy. Generally, concepts that are taught within subject-matter disciplines such as mathematics, science, and language arts can be categorized within a taxonomy. Whether taxonomies have been developed within a subject-matter area often depends on the instructional orientation of the curriculum developer. Certain abstract concepts such as beauty, virtue, and jealousy and those concepts that are not closely identified with a subject-matter domain are not typically represented in a taxonomy (p. 3).

> When a curriculum developer or teacher constructs a taxonomy as a guide for instructional planning, the decisions as to what concepts should be included rests as much with the instructional objectives of the curriculum unit and the characteristics of the learning population as it does with how information or knowledge is organized in the more general subject-matter discipline (p. 5).

Figure 1

Partial Taxonomy Related to Triangle

(from Klausmeier, et al., 1974a)



Not every collection of related concepts constitutes a taxonomy. The basic principle for determining whether a group of related concepts can be labeled a taxonomy is whether they are organized in an inclusive-exclusive fashion on the basis of defining attributes. Concepts which are grouped in accordance with a different principle (i.e., power, beauty, socio-economic status, priority) do not constitute a taxonomy but may form some kind of related nonhierarchical set.

Klausmeier, Ghatala, and Frayer (1974a) have indicated that one primary use of attained concepts is in the understanding of supraordinate, coordinate, and subordinate relationships among concepts. Four mutually exclusive taxonomic relationships that can be seen to exist among concepts organized in a taxonomy have been identified.

Relationship I: Some but not all members of a supraordinate class belong to a given subordinate class.

Relationship II: All members of a subordinate class are also members of a supraordinate class.

Relationship III: The sum of the members of the subordinate classes equals the sum of the members of the supraordinate class.

Relationship IV: The members of one coordinate class are not members of another coordinate class.

These four supraordinate-coordinate-subordinate relationships include the "whole is the sum of its parts" and "sum but not all" classification skills that Kofsky (1966) has indicated culminate in the understanding of class-inclusion relationships.

The Attainment of Concepts

Klausmeier, Ghatala and Frayer (1974a) indicate that many concepts are attainable at each of four successively more complex levels:

Concrete, Identity, Classificatory, and Formal. The cognitive operations involved in the learning of a concept are represented in the Model of Conceptual Learning and Development (Klausmeier et al. See figure 2). The levels of attainment are distinguished from one another on the basis of the cognitive operations that are prerequisite for attaining a concept at a particular level. Each successive level is marked by the emergence of a higher-level operation. Klausmeier et al. (1974a) indicate that:

> Although some of the same operations are postulated to occur at various levels, what is operated on and remembered changes with the attainment of the successively higher levels. That is, the operations are carried out on more sharply differentiated and abstracted stimulus properties at the four successive levels (p. 12).

Additionally, the Model of Conceptual Learning and Development (CLD Model) shows that concepts acquired at the Classificatory and Formal levels can be used to identify examples and nonexamples of the concept, understand supraordinate-coordinate-subordinate relationships involving the concept and other concepts, cognize relationships (principles) of the attained concept with other concepts, and to solve problems. It is indicated that a concept acquired at either the Concrete or Identity levels can be used to solve simple problems that can be solved on the basis of perceptible elements of the situation.

Recent research by Klausmeier, Sipple, and Allen (1974b; 1974c) has demonstrated that the level at which concepts that are organized in a taxonomy are attained is strongly related to the

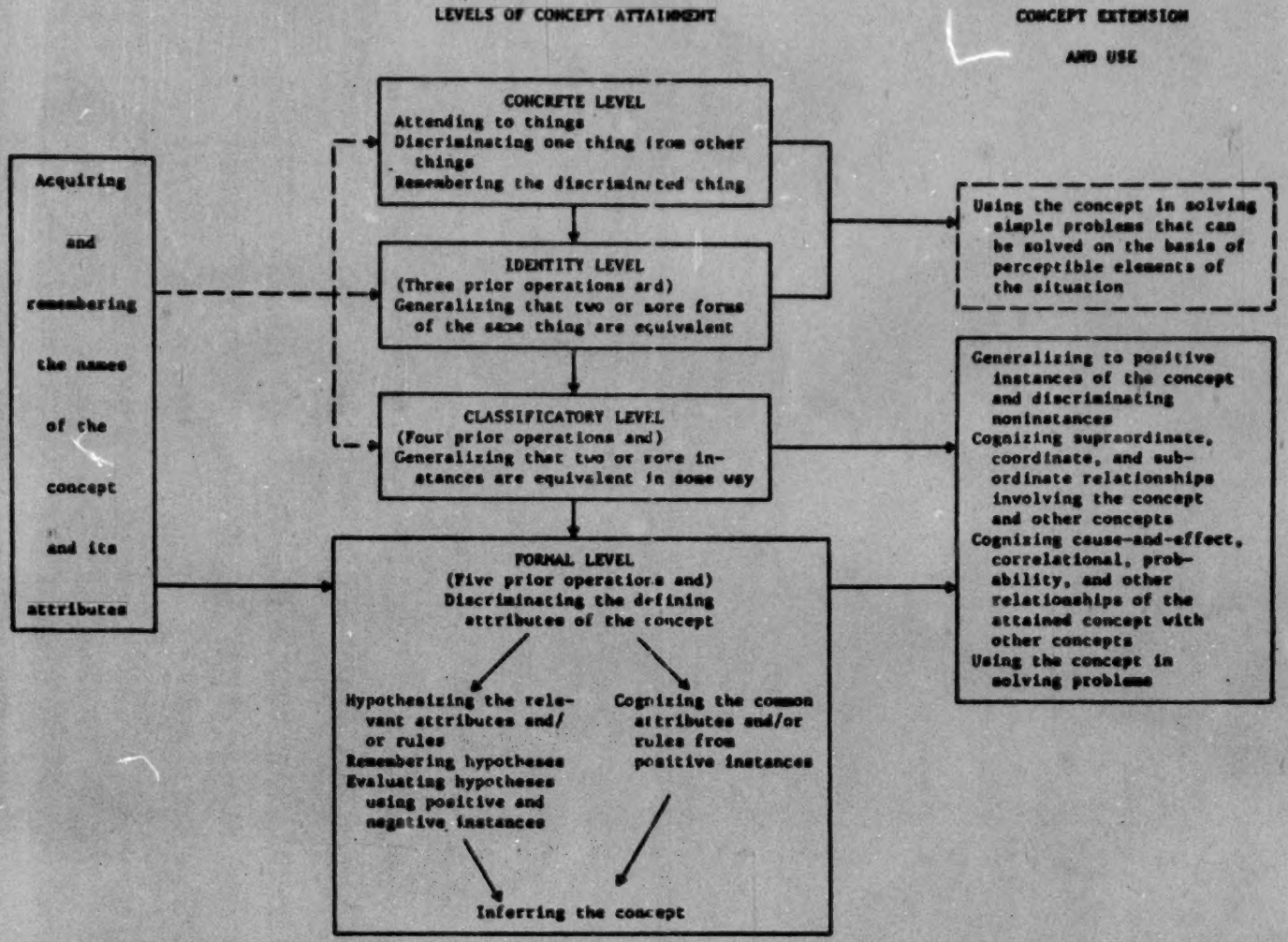

LEVELS OF CONCEPT ATTAINMENT
CONCEPT EXTENSION AND USE
Acquiring and remembering the names of the concept and its attributes
CONCRETE LEVEL
Attending to things
Discriminating one thing from other things
Remembering the discriminated thing
IDENTITY LEVEL
(Three prior operations and)
Generalizing that two or more forms of the same thing are equivalent
CLASSIFICATORY LEVEL
(Four prior operations and)
Generalizing that two or more instances are equivalent in some way
FORMAL LEVEL
(Five prior operations and)
Discriminating the defining attributes of the concept
Hypothesizing the relevant attributes and/or rules
Remembering hypotheses
Evaluating hypotheses using positive and negative instances
Cognizing the common attributes and/or rules from positive instances
Inferring the concept
Using the concept in solving simple problems that can be solved on the basis of perceptible elements of the situation
Generalizing to positive instances of the concept and discriminating noninstances
Cognizing superordinate, coordinate, and subordinate relationships involving the concept and other concepts
Cognizing cause-and-effect, correlational, probability, and other relationships of the attained concept with other concepts
Using the concept in solving problems

Figure 2. The Model of Conceptual Learning and Development

degree of understanding of supraordinate-coordinate-subordinate relationships. Kindergarten, third, sixth, and ninth grade students in two different school systems were administered tests that measured attainment of a variety of school-related concepts (equilateral triangle, noun, and cutting tool). The understanding of taxonomic relationships that were based on these concepts was also measured. Results across all three tests indicated that a higher proportion of students who attain a concept at the Formal level in comparison with those who attain it at the Classificatory level demonstrated understanding of the taxonomic relationships. For example, data for equilateral triangle showed that while 34 percent of those individuals who attained the concept at the Formal level passed the test measuring supraordinate-coordinate-subordinate relationships, only eight percent of those individuals demonstrating concept mastery at the Classificatory level passed the test. Attaining a concept at an advanced level apparently enables the individual to use the concept in cognizing complex, taxonomic relationships among classes of related concepts.

A growing body of experimentation (e.g., Bernard, 1973; Feldman, 1974; Garguilo, 1974; Klausmeier, Sipple & Allen, 1974b; Klausmeier, Sipple & Allen, 1974c; McMurray, Bernard, & Klausmeier, 1974) has shown the CLD Model to be a useful framework from which to characterize the attainment and uses of concepts, the operations that underlie

the learning of concepts at the four levels, and provides a conceptual rationale for the specification of instructional conditions appropriate for the teaching of a concept at a specifiable level of mastery.

Markle and Tiemann (1969; 1972) have proposed a theory of concept instruction which specifies two separate behaviors that underlie the learning of concepts: 1) generalizing among instances of the concept class, and 2) discriminating instances of the concept class from instances of other classes. Each of these behaviors, as will be demonstrated in a later section, have different instructional implications.

Markle and Tiemann indicate three types of errors that are committed when a learner attempts to classify newly encountered examples and nonexamples of a concept. Undergeneralization errors occur when a learn identifies examples of a concept as nonexamples. This first error generally results from providing the learner an insufficient number and/or variety of concept examples. Overgeneralization errors occur when the learner classifies nonexamples of the concept as examples. When a learner fails to discriminate nonexamples from examples, a variety of nonexamples may not have been provided in the teaching situation. Misconception errors which result from an insufficient number of both examples and nonexamples occur when the learner classifies on the basis of irrelevant attributes. Said another way, a misconception is a combination of overgeneralization and undergeneralization errors.

Developing Instructional Materials

It is recognized as "good-sense" to identify objectives of instruction before proceeding to the development of teaching materials. A Plan for Effective Instruction based on task analysis procedures (Bernard, 1975) has been used as a basis for the construction of instructional materials.

The Plan is presented in figure 3. The first step in developing an instructional program is to identify the terminal learning objective. This activity which precedes the actual analysis of the learning task requires a thorough knowledge of the subject-matter domain from which the terminal learning objective is identified. The terminal objective should be stated in operational/behavior terminology. The three subsequent parts of the analysis of the learning objective are described:

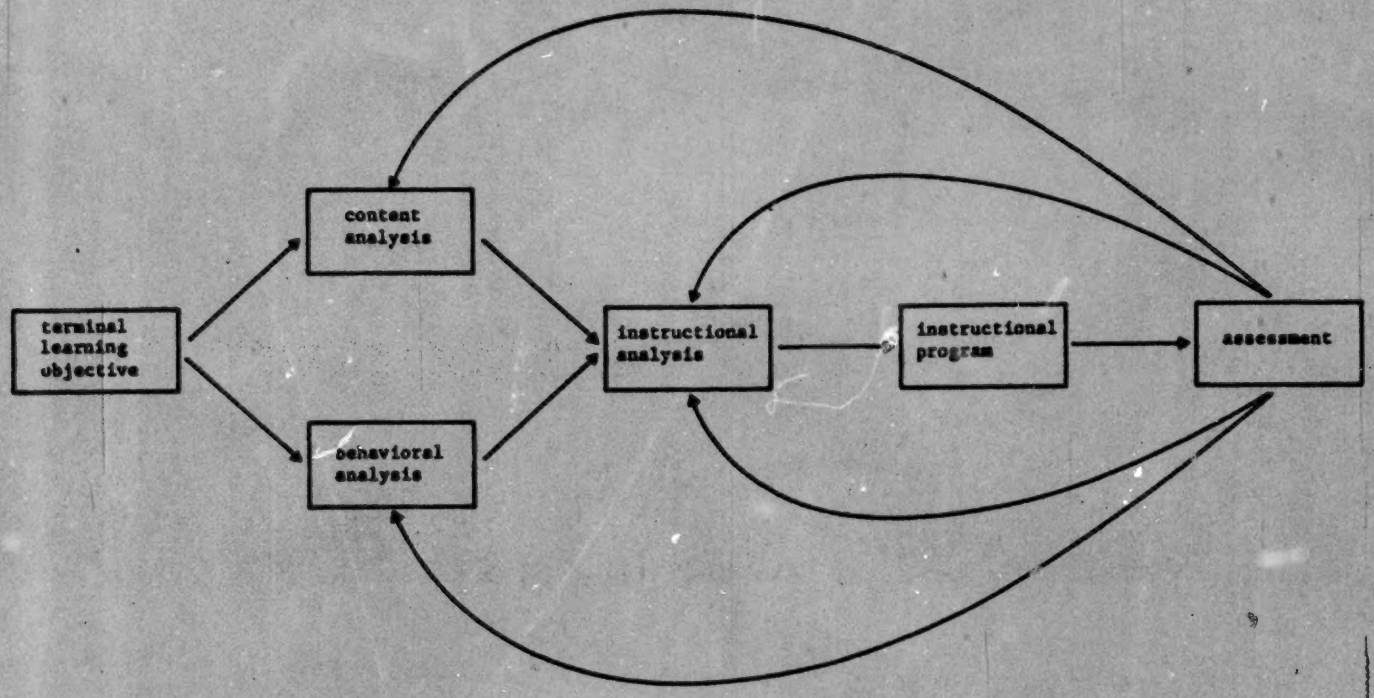
> A content analysis determines the kinds of concepts, principles, and factual information that a student would need to attain the terminal objective. A behavioral analysis identifies those skills and behaviors that a student must acquire before he or she can attain the terminal objective. ...An instructional analysis derives from the two previous analyses and provides a basis for the optional sequencing of instruction (p. 10-11).

Different instructional implications may derive from the content and behavioral analyses. Once the instructional analysis has been accomplished, an instructional program is developed. The program is administered to a target population and an assessment of learning

Figure 3

Plan for Effective Instruction

(from Bernard, 1975)



outcomes is conducted. If the instructional program does not produce the intended effect, an examination of performance on the assessment exercise may suggest where errors in any of the three previous analyses may have been made.

A preinstructional procedure called a concept analysis (Klausmeier et al. 1974a) has been described in detail by Sipple (in press). A concept analysis results in the specification of important information about a concept and of relationships of the concept with other concepts. This analysis can serve as the content analysis in the development of instruction specifically directed at the teaching of concepts. Sipple indicates the various components of a concept analysis:

> The information includes a statement of the definition of the concept in terms of its defining attributes; a specification of those attributes as well as some irrelevant attributes; a specification of the taxonomy in which the concept belongs; a group of examples and non-examples of the concept; a statement of several principles and problem solving exercises involving the concept; and an explicit listing of the key vocabulary associated with the concept (p. 1).

Sipple suggests that whether all or only some of the components of a concept analysis are conducted by a teacher or curriculum developer "depends upon the nature of the particular concept, the level at which the concept is to be taught, and the specific objectives of the curriculum unit (p.2)." Whatever elements of the analysis that are specified by the teacher provide the substantive content for the development of concept instructional lessons.

Concept Instruction at Advanced Levels of Attainment

The following studies deal with different aspects of the concept teaching process. In these studies external conditions that enable

the learner to correctly classify newly encountered examples and nonexamples of the concept are examined. No research dealing with the learning of concepts at lower rudimentary levels of attainment is presented.

It bears mentioning that almost all concept attainment studies conducted up through the middle 1960's examined the acquisition of non-subject-matter concepts. The focus of these studies was on inducing concept attainment through presentation of concept instances (examples and nonexamples) of the concept. The experimental paradigm commonly used in these studies is described by Houtz, Moore, and Davis (1973).

> In the typical conjunctive concept-learning experiment, the subject is presented with a series of stimulus patterns that vary on several dimensions such as shape, size, and color (Bruner, Goodnow, & Austin, 1956). In general, each of these dimensions can take on two or three different values; for example, shape could be either a square or triangle, size could be either large or small, and color could be either red or blue. The subject's task is to learn which particular combination of values (e.g., red and square) define the concept and which dimension is irrelevant (size) and therefore can be ignored. In this case, the subject knows the stimulus population is finite and that any combination of values that conform to the conceptual rule could be a plausible explanation (p. 206).

It is clear that the results of such laboratory-based studies cannot be directly generalized to the learning of subject-matter concepts without extensive cross-validation and external validity studies.

Within the past dozen years, increasing attention has been directed towards investigating conditions of learning that promote the attainment of concepts that are taught in the classroom. Houtz et al., (1973) describes how the paradigm for examining

school-related concept learning differs from the one employed in laboratory-based concept studies.

> Concepts taught in the school, however, may be described more accurately in terms of the presence or absence of certain attributes, not combinations of values of particular dimensions. When a student is confronted with the problem of learning a concept in the classroom, he typically does not know the limits of the stimulus population nor does he know which attributes are critical in defining the concept. In this case, the students task is to learn which attributes must be present in order for a particular instance to be classified as an example of a particular concept. For example, students could be required to learn characteristics of American democracy - three branches of government, two major political parties, electoral college, etc., and biology students might learn general characteristics of mammals - warm blood, young born live, and mammary glands (p. 206).

Whereas many studies of concept attainment examine the rate or ease with which a rule for associating the criterial attributes is acquired, the concept teaching research that deals with subject-matter concepts is more deductive and expository in nature (e.g., definitions are usually provided to the learner).

Difficulty of Teaching and Testing Examples

A major decision in selecting examples and nonexamples of a concept for teaching and assessment is the level of difficulty of concept examples. That is, certain examples and nonexamples of a concept are more "obvious" as concept members than are others. Archer, Bourne, and Brown (1955) and Bulgerra and Archer (1962) have shown that the identifiability of concept examples varies with the proportion of irrelevant attributes.

Merrill and Tennyson (1971b) and Tennyson, Woolley and Merrill (1972) have formulated a simple technique referred to as an "instance probability analysis" for determining the difficulty level of concept examples. Uninstructed subjects are presented with a definition of a concept together with examples and nonexamples. Those concept examples that a high proportion of subjects given only the definition can correctly identify as being members of the concept class are considered "easy". Those that a small percentage of subjects correctly classify are considered "difficult".

Merrill and Tennyson (1971a) found in a study designed to match certain instructional variables (probability, matching and divergency) with specified classification errors that using both easy and difficult examples promoted correct classification behavior. Concept examples are divergent when their irrelevant attributes are as different as possible. A matching situation occurs when an example and nonexample have similar irrelevant attributes (Tennyson & Boutwell, 1973). The concepts of divergency and matching will be more fully developed in a following section.

In the Merrill and Tennyson study, a total of ninety-two positive and negative instances were presented along with a definition of trochaic meter, to 140 undergraduate psychology students. Easy examples were those that were correctly classified by 60 percent or more of the students. Difficult examples were those that 30 percent or less of the students correctly identified. The presentation of only easy examples generally led to errors of undergeneralization while more difficult examples contributed to overgeneralization errors.

The results of the Tennyson, Woolley and Merrill (1972) study substantiated the findings of Merrill and Tennyson (1971a). They discuss their findings as follows:

> The independent variable of probability rating of exemplars is crucial in instructional design. The instance probability analysis did produce ratings that the author could not have known. The most significant difference obtained in this study was between the undergeneralization group and the overgeneralization group. The undergeneralization group was presented only high probability exemplars, and, as a result, responded to few items on the test. On the contrary, the overgeneralization group received only low-probability exemplars and responded to practically every instance on the test (p. 151).

In a study employing the instance probability analysis results of the Tennyson et al., (1972) study, Young, Smith and Merrill (1972) found that the number of correct classification responses given by subjects who learned with both easy and difficult instances was not significantly different from the number of correct classification responses made by subjects who learned only with easy instances. The proportion of undergeneralization errors made by subjects who learned with easy instances did, however, differ significantly from the proportion of undergeneralization responses made by the subjects who learned with both easy and difficult instances.

In a partial replication of the Tennyson et al, (1972) study using a different concept, Tennyson (1973) found that when teaching the concept of adverb, subjects who received both difficult and easy matched and divergent concept examples demonstrated correct classification of newly encountered examples of adverb. Table 1

Table 1

Six Hypothesized Classification Outcomes
(Tennyson, 1973)

Dependent variable outcome	Independent variables presented		
	Probability	Matching	Divergency
Correct classification	All levels	Matched	Divergent
Overgeneralization	Low levels	Unmatched	Divergent
Undergeneralization	High levels	Matched	Divergent
Misconception	All levels	Unmatched	Convergent
Overgeneralization A	All levels	Unmatched	Divergent
Undergeneralization A	High levels	Unmatched	Divergent

presents six hypothesized outcomes that resulted from a differential combination of probability, matching and divergency variables. Subjects were found to respond on a posttest according to the hypothesized outcomes.

Harris (1972) investigated the effects of type, identifiability, and variety of instructional instances on the attainment of a subject-matter concept, "Clear" (easy) and "Obscure" (difficult) instructional instances were identified that stemmed from the following definition of identifiability:

> For positive instances it was assumed that clarity of identification increased while for negative instances it was assumed that clarity of identification increased as the proportion of relevant to irrelevant attributes decreased (p. 5).

No instance probability analysis was conducted. As such, Harris' approach to identifying the "obviousness" of concept examples has to be considered less scientific, more applied and subjective than an instance probability analysis.

The results of the Harris study suggest that the difficulty level of concept examples need not have direct and obvious instructional implications. The use of difficult examples did not facilitate generalization nor discrimination any more than did the use of easy examples. Significant interactions revealed that discrimination was aided when large numbers of difficult examples were presented to the learner. Generalization was facilitated when a small number of easy negative examples were used.

Concept Definition and Attribute Emphasis

Fairly conclusive evidence has accumulated which indicates that the presentation of a concept definition which indicates the relevant attributes of the concept as well as techniques which further clarify the attributes of concepts are powerful variables in facilitating concept attainment. The identification and recall of relevant attributes of a concept is critical in the process of generalizing among examples of the concepts and discriminating examples from nonexamples (e.g., Mechner, 1971). One procedure for identifying the relevant and irrelevant attributes of a concept is by presenting them in a definition. The general term used to describe instructional techniques which focus the learner's attention on concept attributes is "attribute emphasis" (Feldman & Klausmeier, 1974) or "attribute prompting" (Tennyson & Boutwell, 1973).

> Prompting is a term which means identifying the critical attributes by various devices such as verbal descriptions, diagrams, arrows, etc. (Tennyson & Boutwell, 1973, p. 9).

Detamble and Stolurow (1956) suggested two rules for arranging stimulus information to facilitate concept learning. The arrangment of information according to their rules can be seen to serve an attribute prompting function.

1. When the same relevant cue (attribute) is presented on adjacent trials, as many as possible of the irrelevant stimulus components should have different values on the two trials.

2. When two different relevant cues (attribute) are presented on adjacent trials, as many as possible of the irrelevant stimulus components should be kept constant (p. 40).

One of two concept teaching sequences developed according to the above rules and one which presented information in reverse of the prescribed order were presented to 600 college undergraduates by Detamble and Stolurow. Subjects who received teaching instances according to Detamble's and Stolurow's rules attained the concept more easily than did subjects who received the concept instances in a reverse order. They summarize their results as follows:

> Specifically, the results strongly support the experimental hypothesis that, in the class of concept learning situations under consideration, the training efficiency of a sequence of items is negatively related to the degree of synchrony of relevant and irrelevant stimulus components occurring in the sequence (p. 39).

Anderson (1964) and Anderson and Guthrie (1965) replicated the results of the Detample and Stolurow (1956) study. In these studies treatment groups differed solely in terms of the sequence of stimuli presented. As predicted, for an alternating presentation of instances and noninstances the condition in which only one attribute changed was superior to the condition in which many attributes changed. When subjects received a series of either all positive or all negative instances (content series), the condition in which many attributes changed was superior to the condition in which one attribute changed.

Frayer (1970) reviewed considerable literature on the emphasis of relevant attributes. She found that "the emphasis of relevant attribute values by verbal cues has been shown to improve immediate concept learning performance, transfer, and retention (p. 24)."

Merrill and Tennyson (1971a) found that subjects who received a definition with labeled positive and negative concept instances performed better on a test that assessed whether subjects could correctly identify newly encountered concept instances than subjects who only received positive and negative instances.

Merrill and Tennyson (1971b) investigated attribute prompting variables in the learning of classroom concepts. The four independent variables identified and manipulated in the study were the following:

1. Definition presentation. Consists of displaying a statement identifying the relevant attributes shared by a set of objects or events in a given class.

2. Attribute definition. A procedure that defines and clarifies for the learner each attribute of the class.

3. Examplar-nonexamplar presentation. A procedure for presenting or matching examples and nonexamples so that differences between the two are highlighted in terms of relevant attributes.

4. Attribute prompting presentation. Consists of explanatory information which indicates class membership and identifies the attributes of each exemplar or the absence or relevant attributes of each nonexamplar (p. 3).

They found that subjects who only received a definition of the target teaching concept "trochaic meter" performed slightly better than a non-instructed control group. When an explanation of the subconcepts contained in the defintion was added performance improved. The most powerful variable was found to be the attribute prompting variable. When attribute prompting was added to the exemplars/ nonexemplar only presentation, the error rate dropped considerably.

The most effective condition for facilitating correct classification behavior consisted of presenting the definition, defining the attributes, presenting matched examples and nonexamples (discussed in a subsequent section), and prompting of the attributes.

In a study by Anderson and Kulhavy (1972), a high level of concept learning was demonstrated by college-age students who were presented solely with a concept definition. Subjects were provided with a one-sentence definition of a group of unfamiliar concepts that was used to identify examples of these concepts on a multiple-choice test. The group that received the definition made ten-fold fewer errors than a control group which did not receive the definition.

Klausmeier and Feldman (1975) determined the effect of the amount and type of information supplied by a definition on the level of concept attainment of fourth- and eighth-grade students. Both groups were presented with one of two definitions: a "common usage" definition found in a children's dictionary which did not specify all of the defining attributes of the concept, and a "technical definition" which specified all of the defining attributes of the concept. Fourth-grade students who received the common usage definition performed better on a classification task than those who received the technical definition. Eighth-graders performed significantly better with the technical than the common usage definition.

Methods of Presentation

A majority of studies that have examined the sequencing of positive and negative instances have found that, contrary to intuition, negative instances are less than effective in promoting concept attainment. The applicability of this conclusion to the instruction of concepts typically taught in the classroom appears unwise. The instructional unit of analysis employed in these studies has generally been nonsubject matter concepts. The concepts generally have had a finite number of relevant and irrelevant attributes. Subjects attempted to guess a definitional rule from a series of concept instances.

Another major shortcoming of these studies is that when examples and nonexamples where presented in the same series, no attempt was made to select particular examples or nonexamples that would highlight or distinguish relevant and irrelevant attributes of the concept. It may well be that when nonexamples are presented in a discrete, haphazard fashion, the naive learner is not able to utilize or assimilate the informational components of the nonexamples. Tennyson (1973) has indicated a lack of operational control between examples and nonexamples. Tennyson has also implied the need for an operational definition of the relationship between examples and nonexamples according to their irrelevant attributes.

Systematic Approaches to the Teaching of Classroom Concepts. This section will consider two systematic instructional methodologies for classroom concept teaching that derive from empirical

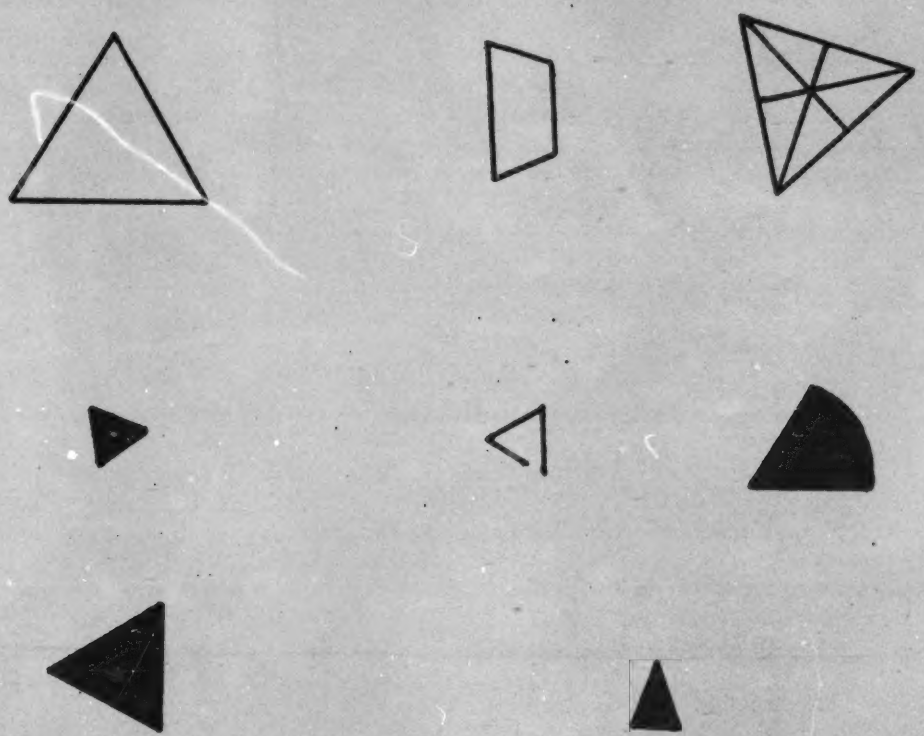
research. In addition, two studies that incorporate a variety of instructional strategies will be discussed.

Mark e and Tiemann (1970) have proposed the use of a rational set of concept teaching examples and nonexamples to prevent errors of overgeneralization, undergeneralization, and misconception in classification behavior. A rational set contains sufficient concept examples to vary each major irrelevant attribute of the concept across all examples, and enough nonexamples so that each nonexample lacks one of the relevant attributes while possessing as many of the other relevant attributes as possible. By determining the relevant attributes and important irrelevant attributes of a concept, it is possible to specify the number and kind of teaching examples to include in a rational set. Relevant attributes are those characteristics which are shared by all members or examples of the concept. Irrelevant attributes are those characteristics or properties which nonexamples may or may not have in common with examples. Relevant attributes serve to define the concept.

Feldman (1974) presented a rational set of examples and nonexamples for the concept equilateral triangle (see Figure 4). As can be seen, examples vary on the irrelevant attributes of spatial orientation, size, and whether they are solid or line drawings. Each of the relevant attributes (sides of equal length, three straight sides, simple figure, closed figure) are systematically excluded in the five nonexamples.

Figure 4

Rational Set of Examples and Nonexamples
for the Concept Equilateral Triangle
(From Feldman, 1974, p. 29)



Examples

Nonexamples

Markle and Tiemann (1972) indicate that generalization can best be taught by presenting examples that vary as much as possible in irrelevant attributes. Discrimination is aided through using nonexamples that contain all but one of the relevant attributes.

Feldman (1972) conducted three separate experiments to examine the effects of number of positive and negative instances, concept definition, and emphasis of relevant attributes in the attainment of mathematical concepts. In the first experiment, the effect of presenting a rationally chosen set of positive and negative instances was contrasted with the effect of presenting either a rationally chosen set of positive instances alone or two randomly selected positive instances. A concept definition was given in addition to teaching instances (same ones used in the first experiment) in the second experiment. The third experiment determined the effect of presenting a rationally chosen set of positive and negative instances alone versus either presenting the same rational set with a concept definition or concept definition with relevant attribute emphasis.

The dependent measure in the Feldman study was the subjects' ability to correctly identify newly encountered concept instances. Results indicate that a rational set of positive and negative teaching instances is generally facilitative of concept learning performance. Feldman summarized the major findings of all three studies as follows:

> First the use of nonexamples which focus the subjects' attention on relevant attributes of the concept was found to be a facilitative instructional technique. Second,

> providing a concept definition generally compensated for presenting only the rational set of examples (with no nonexamples), and negated any possible effects due to the number of examples given. Third, presenting the rational set of examples and nonexamples was not consistently found to be effective. Finally, adding emphasis of relevant attributes to the rational set of examples and nonexamples plus a concept definition was generally not found to significantly increase performance (p. 85).

Swanson (1972) conducted a series of three experiments that directly paralleled the three contained in Feldman's (1972) study. In teaching sixth-grade children the concepts, population, habitat, and community, Swanson found that the presentation of examples and nonexamples in a rational set aided correct classification of unencountered instances. Subjects who were presented with rational sets without negative instances committed significantly more errors of overgeneralization than subjects who received a complete rational set. In contrast to Feldman's results, when attribute emphasis was provided along with a rational set of examples and nonexamples and a concept definition, recognition of new examples was enhanced. Interestingly, providing a concept definition with a rational set of instances and noninstances was not more effective in promoting concept learning than providing the rational set alone.

Feldman and Klausmeier (1974) investigated the effects on concept attainment of presenting various combinations of rational sets and a concept definition to fourth-grade children. They predicted that subjects who were presented with either a rational set or a concept definition would perform equivalently on a classification task. Subjects receiving both sources of information

were predicted to do better than subjects presented with only one or the other. It was also hypothesized that subjects who were presented with a definition and three rational sets would make fewer classification errors than subjects presented with one rational set and the definition. Results indicated that each of the four treatment groups was higher than a control group. Further, the group receiving the definition and three rational sets performed better than the three other treatment groups. No other comparisons were significant.

Tennyson and Boutwell (1973) have specified a systematic way of selecting and sequencing concept instances in classroom concept teaching which they refer to as a concept set. Their work is based on recent research by Merrill and Tennyson (1971a; 1971b), Tennyson, Woolley, and Merrill (1972), Tennyson (1973) and others.

A concept set is a group of three instructional procedures or components which are directed at the promotion of appropriate generalization and discrimination behavior. As such, their methodology is primarily focused on teaching to the Classificatory rather than Formal level of concept attainment (Klausmeier, et al., 1974). A description of a concept set is provided in the following:

> Effective concept teaching not only employs examples and nonexamples, but employs matched sets and divergent sets. The most efficient organization of examples and nonexamples is in a "concept set". A concept set consists of two divergent examples, each matched to a nonexample, with prompting of the critical attributes... This (prompting) helps focus the student's attention on the attributes which define the concept class. A third necessary component of a concept set is the equal difficulty of the instances, i.e., some examples are easier to recognize

> than other examples, thus the harder the example the more difficult it would be to identify by the student (p. 9).

An example of a concept set dealing with the concept mutualism is provided in table 2. The two examples are divergent since one refers to land organisms while the other sea organisms. Prompting takes the form of verbal descriptions about the relationships between the two organisms. The difficulty of the examples and nonexamples is considered "easy" since the two examples are readily recognized as members of the concept mutualism and the two nonexamples are easily recognized as nonmembers of the class. It should be noted that apparently no attempt was made to systematically match examples and nonexamples so that each shared similar irrelevant attributes. This may have been a function of the type of concept being taught.

Tennyson and Boutwell indicate that one concept set is insufficient for learning and recommend a range of difficulty of sets. Each succeeding concept set should be successively more difficult from one another. That is, individual concept sets should be divergent. The total number of concept sets to include in an instructional program is determined by the complexity of the concept. No criteria or formula is provided that matches given levels of concept complexity with optimal numbers of concept sets. A concept set divergent to the one just presented is shown in table 3.

In a study by Tennyson, Woolley, and Merrill (1972), the independent variables of probability, matching and divergence

Table 2

Concept Set for Mutualism
(From Tennyson and Boutwell, 1973, p. 9-10)

Definition: Mutualism is a phenomenon in nature in which two associated organisms derive benefit from living together.

Critical attributes: Size, type of benefit

Concept Set

Example: Tickbird and Rhinoceros

Attribute prompting: The tickbird eats lice off the rhino (his main source of food), and in turn the tickbird warns the rhino of approaching animals. (Both benefit)

Not an example: Fleas on a dog

Attribute prompting: The fleas live on the blood of the dog and are a hindrance to him. (Parasitism)

Example: Hermit Crabs and Sea Anemones

Attribute prompting: The sea anemone settles on an old shell inhabited by the crab. Other predators won't attack the crab because of poison tentacles, and in turn the crab moves the anemone around.

Not an example: Small fish and Sea Cucumber

Attribute prompting: The small fish lives in cloaca of the sea cucumber (protection and dispersal) while hindering the cucumber.

Table 3

(Divergent) Concept Set for Mutualism
(From Tennyson & Boutwell, 1973, p. 11)

Example: Termite and Flagellate Protozoa

Attribute prompting: The protozoa find a place to live in the stomach of the termite and provide enzyme to digest weed. (Both benefit)

Not an example: Tapeworm and man

Attribute prompting: The tapeworm lives in the adult stage as a parasite in the intestines of man.

Example: Algae and Fungus

Attribute prompting: The algae produce food for the fungus and the fungus holds water that the algae use to make food. (Both benefit)

Not an example: Dodder on plants

Attribute prompting: The dodder seeks nourishment from the host plant.

were investigated in the context of predicting concept acquisition and specified classification errors. By manipulating the three independent variables into four treatments, Tennyson et al., predicted the following four dependent variables:

1. Correct classification. All instances, exemplars and nonexemplars correctly identified.

2. Overgeneralization. Nonexemplars similar to class members identified as exemplars.

3. Undergeneralization. Low probability exemplars identified as nonexemplars.

4. Misconception. Exemplars and nonexemplars sharing a common irrelevant attribute identified as class members.

Each subject was presented a definition of the concept (adverb) and a task according to one of the following hypotheses. If high to low probability, divergent, and matched examples and nonexamples are presented, then correct classification ensued. If low probability, divergent, and nonmatched examples and nonexamples are used, then overgeneralization errors occurred. Misconceptions occurred when high to low probability, convergent and nonmatched teaching instances are presented. However, even where correct classification was hypothesized, some overgeneralization was observed. Merrill and Tennyson (1971b) obtained similar results using a concept set approach to teach the concept crystal.

In an extension of the Tennyson et al. study, Tennyson (1973) also promoted concept acquisition by manipulating positive and negative instances in teaching the concept of adverb. Specifically, the stimulus similarity variables of probability, matching, and divergency produced the same specified concept

classification errors of overgeneralization, undergeneralization and misconception as reported in the Tennyson et al., (1972) study.

Whereas in Tennyson's initial experiment subjects responded according to the hypothesized outcomes, in a second experiment where negative instances were removed from all treatment conditions subjects responded randomly on a posttest. Tennyson interpreted this result as verifying that negative instances are an integral part of concept acquistion.

While the Tennyson et al. (1972), Merrill and Tennyson (1971b), and Tennyson (1973) studies examined the divergency, matching, and probability components of a concept set, Merrill and Tennyson (1971a) examined attribute prompting variables in teaching the concept trochaic meter. Their findings suggest that "a prompting variable, by identifying the relevant attribute in each exemplar and the absence of the relevant attributes in nonexemplars, further defines the concept (p. 20)." The addition of an attribute prompting variable to a condition where only matched examples and nonexamples were presented decreased error rates sifnificantly. When a prompting variable and the attribute definitions were added to a condition which presented a definition and matched examples and nonexamples, performance was highest of all.

Woodson (1974) taught seven verbal concepts dealing with Chinese characters to 12 undergraduate students. One of each of the following seven instructional methods was used to teach all seven concepts to each student: (a) stating of a definition,

(b) instructions intended to identify the relevant attributes of the concept, (c) instructions intended to identify the irrelevant attributes, (d) showing of examples of the concept, (e) showing of nonexamples of the concept, (f) description of the domain of the concept (e.g., "This Chinese character applies to things which have a shape."), and (g) use of analogies to describe the concept (p. 184). The following four measures of learning were used to assess learning of the seven concepts.

1. Definition. The subject was asked to "explain what the following character means".
2. Exemplars. The subject was asked to give several examples of things to which the character applies.
3. Nonexamples. The subject was asked to give several examples of things to which the character does not apply.
4. Classification. The subject was asked to classify as examples or nonexamples a sample of 10 possible instances... that the subject had not encoutnered in training (p. 185).

The ordering of instructional conditions on each measure of learning was as follows. Definition: relevant attributes > definition = exemplars > analogy > domain > irrelevant attributes > irrelevant attributes = nonexemplars. Exemplar: exemplars = relevant attributes = definition = domain > analogy > irrelevant attributes > nonexamples. Nonexemplar: definition = relevant attributes > nonexemplars > domain > analogy > exemplars > irrelevant attributes. Classification: relevant attributes > definition > domain exemplars > analogy > nonexemplars = irrelevant attributes. The

small number of subjects used in the study minimizes the validity of Woodson's findings.

McMurray, Bernard, and Klausmeier (1974) developed teaching lessons that incorporated the following instructional conditions which were identified as being potentially facilitative of Formal level concept learning: (a) use of definition, (b) empirical selection of concept examples and nonexamples through an instance probability analysis, (c) use of rational sets of examples and nonexamples, (d) pairing of examples with nonexamples, (e) emphasis of relevant attributes, (f) teaching of a strategy to associate the relevant attributes of the concept in a conjunctive fashion, (g) feedback, and (h) active involvement by the student (p. 3-4).

Fourth-grade students received either two instructional lessons developed to teach the concept equilateral triangle or two placebo control lessons. Tests were developed to assess whether students could classify examples and nonexamples of the concept, discriminate the defining attributes of the concept, identify the name of the concept and each defining attribute, differentiate between examples and nonexamples of the concept and recognize the concept definition.

The eight instructional strategies proved highly effective in facilitating performance on all five assessment measures. While eleven percent of the control group demonstrated attainment of equilateral triangle at the formal level, sixty-four percent of

the subjects who received instruction demonstrated formal level mastery. Significant differences between a non-pretested instructed and noninstructed group were as follows: classification (.93-.64), discriminating the attributes (.93-.57), vocabulary (.82-.11), differentiating examples (.79-.11) and definition (.71-.14). Comparable results were found for a pretested instructed and noninstructed group. A significant amount of retention was observed in a two month follow-up assessment.

It is apparent from the studies just reviewed, that effective concept teachings require a consideration of multiple and interrelated factors. Examples and nonexamples have to be selected to focus the learner's attention on the criterial differences between them. Difficult and divergent examples must be provided to insure proper generalization. Discrimination is fostered through the use of examples and nonexamples that share all irrelevant attributes and all but one relevant attribute. Unanswered questions as to how the nature or complexity of a concept and learner characteristics interact with the instructional condition just reviewed remain to be answered.

The Effects of an Advance Organizer and Within-Text Questions on the Learning of Meaningful Prose Material

Research on the learning and retention of prose material has been carried out for many years. The study of meaningful learning processes apparently arose from the deficiencies of laboratory based research in dealing with and identifying optimum instructional procedures for school learning. Moreover, processes and factors which have been employed to explain the learning and retention of non-meaningful material have been shown to fail to account for the learning of meaningful material (e.g., Ausubel, Robbins, & Blake, 1975). Prose material has constituted the instructional unit of analysis in many studies dealing with meaningful learning. Since students in fact acquire new concepts as a result of reading prose, it is felt that research on prose learning may contain additional perspectives on the teaching of subject-matter concepts. A number of studies that have dealt with the learning of school materials have suggested that the presentation of an advance organizer and the insertion of questions in reading material have facilitative effects on the learning of information and ideas.

Advance Organizers

Ausubel (1963; 1968) and Ausubel and Robinson (1969) have proposed a theory of learning, retention, and forgetting

which directly addresses matters of school learning and instruction. Ausubel suggests that efficient learning and retention of meaningful verbal material can be explained by examining the clarity, stability and generality of ideas possessed by the learner (cognitive structure) which are related to the material to be incorporated. According to Ausubel et al., (1957), cognitive structure is hierarchically organized in terms of highly inclusive concepts under which are subsumed less inclusive concepts and informational data. Further:

> The existing concepts in cognitive structure make possible the understanding of various kinds of significant relationships. Learning is shaped by the relevant characteristics of the learner's existing ideational-conceptual system existing with the total cognitive structure (Ausubel, 1963, p. 23).

Learning is determined by the pre-existence of more general ideas in the cognitive structure under which new information can be subsumed.

Ausubel indicates that when a new idea is meaningfully learned (initial learning) it is incorporated into a pre-existent set of meanings. The more clear and discriminably different the new idea is from established meanings, the more likely it is to be integrated into the cognitive structure (retention), and to remain disassociated and to maintain its separate identity. Ausubel and Youssef (1963) explain this relationship in more detail:

> If, for example, the learner cannot discriminate between new idea A' and old idea A, A' does not really exist for him; it is phenomenologically the same idea as A. Furthermore, even if the learner can discriminate between A and A' at the moment of learning, unless the discrimination is sharp and free from ambiguity and confusion, there will be a tendency over time for A' to be remembered as A as the two ideas interact during the retention interval. Since in any case it is characteristic of the organization of knowledge in memory for unfamiliar and unestablished ideas to be reduced to familiar and established ideas, this process of reduction is accelerated if the new and unfamiliar concepts are not sufficiently discriminable from the old (p. 331-332).

Ausubel does not indicate that learning cannot take place unless adequate subsuming concepts are available. He does suggest that information learned in a meaningful way - nonarbitrarily related to previous ideas - is more useful to the individual than information that cannot be related to or subsumed by more inclusive and related ideas (i.e., rote learning). The following paragraph synthesizes the distinction between meaningful and rote learning:

> Meaningful learning is more efficient because of the advantages inherent in a substantive and nonarbitrary relatability of new ideas to relevant established ideas in cognitive structure. As a consequence, a greater quantity of material can be incorporated into cognitive structure in a given period of learning time and made more available immediately after learning...Further, this same relatability to established ideas provides meaningfully learned material with anchorage that continues throughout the retention stage and helps to insure its longevity in memory. Rotely learned material, on the other hand, enjoys no such anchorage and is incorporated into cognitive structure only in the form of arbitrary associations, that is, as discrete, self-contained entities organizationally isolated, for all practical purposes, from the learner's established ideational systems (Ausubel & Robinson, 1969).

Ausubel proposes the use of an advance organizer as a means of insuring the presence, clarity, discriminability and generality of ideas in cognitive structure. An advance organizer is defined as:

> ...a complex and deliberately prepared set of (inclusive and general) ideas which is presented to the learner in advance of material to be learned to insure that relevant anchoring ideas will be available (Ausubel & Robinson, 1969, p. 145).

Two types of advance organizer have been used by Ausubel and others to test the hypothesis that learning and retention of unfamiliar but meaningful verbal material can be facilitated by the advance introduction of relevant subsuming concepts. If the learning material is entirely unfamiliar to the learner, an expository organizer would be employed. Information is presented at a much higher level of generality, abstraction and inclusiveness than the material to be taught. As such it provides a relevant anchoring structure for the learning of new material. When the new material is a variant of related, previously learned information already present in cognitive structure, a comparative organizer would be used. A comparative organizer provides advance "ideational scaffolding" where the relevant assumptions, principles and general concepts of the material to be learned are presented. It presents the major similarities and difference between the relevant previously learned ideas and the new material. Further, it orients the learner to discriminate similarities and differences between the old and new ideas.

Ausubel (1960) examined the effect of an expository organizer on the learning of a 2,500 word passage dealing with the metallurgical properites of plain carbon steel. One hundred and twenty experimentally naive undergraduate students read either an expository organizer which contained basic principles of metallurgy and important factual information, or an introductory passage dealing with relevant, historical background material which contained no conceptual material that could serve as an ideational framework. Both groups subsequently studied the same passage on the properties of steel and were tested on a multiple-choice test three days later. Significant differences were observed between the two groups.

Ausubel and Fitzgerald (1961) found that a comparative organizer could be used effectively to increase discriminability between new material and related concepts already established in cognitive structure. Three groups of subjects read an expository organizer, comparative organizer, or historical introduction on Buddhism. The comparative organizer compared the ideas of Buddhism and Christianity. It was felt that the unfamiliar material dealing with Buddhism was relatable to previously learned concepts dealing with Christianity already present in cognitive structure. The learning passage consisted of a 2,500 word passage on the principles of Buddhism. Retention of the Buddhism material was tested three and ten days after the learning sessions by means of equivalent forms of a multiple-choice test.

Subjects who demonstrated greater knowledge of Chritianity made higher sco[illegible] the Buddhism retention tests - even after the effect of ver[illegible]al ability was eliminated - than did subjects with less knowledge of Christianity. Ausubel and Fitzgerald indicated that this finding supported the hypothesis that "learning and retention of unfamiliar verbal material varies positively with its discriminability from related previous learned concepts established in cognitive structure (p. 274)."

Whereas only the comparative organizer facilitated performance on the three-day posttest, both organizers over the 10-day interval were significantly effective. Of keen interest, however, was the finding that the facilitating effects of the organizers on retention only applied to subjects in the below-median subgroups on the Christianity test. The authors conclude that both organizers appeared to be effective "only in those instances where existing discriminability between two sets of ideas is inadequate - as a consequence of the instability or ambiguity of established concepts (p. 274)."

An expository organizer was found effective in enhancing the learning of only those subjects with relatively low verbal ability in a study conducted by Ausubel and Fitzgerald (1963). No such interaction of verbal ability with organizer was found in the Ausubel et al., (1961) study dealing with an comparative organizer. The authors propose that subjects of average or better ability are

able to spontaneously organize new learning material around "relevant, more inclusive concepts, and hence derive little or no benefit from introduced advance organizers (p. 247)."

Ausubel and Youssef (1963) found that previously learned background material (Christianity) facilitated the learning and retention of the first of two parallely-related unfamiliar learning passages dealing with Buddhism and Zen Buddhism. Comparative organizers dealing with similarities and differences between Buddhist and Christian and between Buddhist and Zen Buddhist doctrines were found to facilitate retention of the Buddhist learning passage. The organizers failed to facilitate significantly the learning and retention of the second passage. With verbal ability controlled, knowledge of the Buddhism passage apparently induced learning of the Zen Buddhism passage.

Scandura and Wells (1967) investigated the use of advance organizers in learning abstract mathematics. The presentation of two historical introductions to two different learning passages dealing with abstract mathematical groups and with combinatorial topography was compared with the presentation of two concrete models of abstract mathematical ideals (organizers). Higher performance was demonstrated on tests of both learning passages by the group that received the organizers.

Gagné (1969) examined the effects of context on the learning of five facts presented in five different sentences. The sentences

were presented in massed or spaced accompanying contexts containing (a) a related form of a topic sentence, (b) coordinate facts, (c) unrelated facts, and (d) an "isolated" presentation condition containing no context facts. No significant effect of massed versus spaced presentation was observed. The no context condition was significantly better than all other conditions in promoting condition recall. Superordinate context was superior to coordinate, and this, in turn, superior to unrelated context. Gagné indicated that the findings that superordinate and coordinate contexts facilitate recall are consistent with the findings of Ausubel:

> ...to the effect that retention of meaningful facts is improved when efforts are made to mobilize anchoring ideas with a preexisting cognitive structure. Somehow, even in the face of interference (massed presentation of facts), the organization of facts into topics operates to facilitate retention of particular facts (p. 413).

Gagné and Wiegand (1970) conducted a follow-up to Gagné's (1969) study to determine the effects on fact retention of the presentation of a superordinate and coordinate context during learning and just preceding recall. The results obtained indicate that the superodinate topic sentence improved the remembering of facts when presented just before the retention test.

Proger, Taylor, Mann, Coulson, and Boyuls (1970) randomly assigned 124 college seniors to one of four types of advance organizer ("conceptual pre-structuring") conditions: (a) completion pretest, (b) true-false pretest, (c) sentence outline, and (d) paragraph abstract. On a test measuring learning of information

specifically introduced in each of the four advance organizers, subjects who received the covert organizers (conditions a and d) performed significantly better than subjects in the other two overt groups. None of the advance organizers showed any evidence for "general conceptual facilitation"; that is, no significant differences were found on the 12 items not stressed in the advance organizers.

Weisberg (1970) examined the use of two visual (graph and map) and one verbal advance organizer in facilitating the learning of earth science concepts. Results indicated that only the two visual organizers were facilitative of learning.

Kuhn and Novak (1970) found expository organizers dealing with two major concepts of modern biology ("levels of biological organization", and "homeostasis") helpful in aiding the learning and retention of two introductory biology lessons. Matched historical introductions were found nonfacilitative.

Ring and Novak (1971) investigated the relationship of the number of preexisting chemistry facts and subsumers in cognitive structure of high school graduates to achievement by the same population in a first-year college chemistry course. Prior to attending their first college-level course in chemistry, 770 students were tested to ascertain the "fact and subsumer orientation of each subjects cognitive structure (p. 326)." The criteria for selecting items for inclusion in the test were relevance to

to high school chemistry, the subsumer or factual nature of the item, and relevance to college chemistry.

End of the semester chemistry achievement scores were used to compare with pretest data. The results indicated that while course achievement varied in a linear fashion to the number of facts and number of relevant subsumers in cognitive structure, the facilitating role of preexisting facts was dependent upon the presence of subsumers. Students who knew many facts but few subsumers achieved at a very low level. The presence of a great many disorganized facts did not aid in learning of new material. High achieving students demonstrated cognitive structures in which facts were apparently discriminable from subsumers. Possession of relevant facts and relevant subsuming concepts was necessary for high achievement. Data also indicated that achievement was determined by relevant cognitive structure rather than general ability traits (covariates in the study were math and verbal scholastic aptitude test scores). It appears that this study provides a great deal of support for the validation of Ausubel's theory of learning.

Graber, Means, and Johnsten (1972) failed to find any effect of subsuming concepts on student achievement on unfamiliar science learning material. One hundred and forty students enrolled in a beginning university course in chemistry were administered an organizing test developed by the senior author. Each student was asked after reading a passage to organize concepts presented in

an outline of the passage into proper sequence. The top third (good organizers) and bottom third (poor organizers) were randomly assigned to one of three treatment conditions: advance organizers, post organizers, nonorganizers. The advance and post organizers were almost identical. Results of a test based on a learning passage indicated no significant differences among the three types of subsumers. A variety of explanations were offered concerning the findings ranging from "the findings represented a statistical rarity" to "the subject matter of the learning passage was too difficult for the subjects." The results do suggest subsumers cannot be expected to facilitate learning under all conditions.

Yawkey and Dashiell (1973) examined the effects of pre- and post-organizers introduced at the beginning or end of class periods, twice weekly, over a three and a half month period. Organizers took the form of behavioral objectives. On a test administered seven days after a course in "Mathematics in Early Childhood Education" was completed, the 24 subjects enrolled in the post organizer class performed significantly better than subjects in the preorganizer class. The lack of experimental controls and within-class random assignment to experimental conditions greatly reduces the validity and significance of the findings of the study.

It is clear from the studies just reviewed that an advance organizer can be a valuable instructional adjunct. It is unclear whether well-organized subsumptive material acts solely as a general

orienting direction that facilitates the discrimination of categories of new material to be learned, promotes the anchoring of new material in cognitive structure, or both. Since the presentation of an advance organizer was particularly useful for students low in background subsumers and facts and was not extremely helpful for students high in preexisting knowledge, it may be that it is structural and organizational properties of organizers that enhances learning of meaningful material.

Within-Text Questions

Most of the research that deals with the instructional effects of within-text questions derives from the theory of Rothkopf (1965) concerning mathemagenic behavior. Rothkopf asserts that those activities which a learner engages in when presented with written material determines what will be learned. Those overt and covert activities which play a role in learning from written material have been given the name of mathemagenic behavior (behavior that produces learning). Rothkopf notes that the name is derived from the Greek roots mathema (that which is learned) and gignesthai (to be born).

Rothkopf indicates that overt mathemagenic behaviors include gross postural adjustments of the head and body toward the printed page and eye movements over the page. Covert mathemagenic behaviors that have been hypothesized to exist are (a) translation of written symbols into internal speech, (b) segmentation of internal speech

through intonation and rhythmic organization into phases, sentences, and other syntactic components, and (c) augmenting of effective stimuli (psychological responses to printed matter) by responses that are evoked by them. These include echoic responses (rehearsal, review), mediating response chains of various kinds such as arithmetical calculation or deduction, and the invention of mnemotechnic devices (pp. 199-200). These responses contribute to stimulus selection by the learner. A primary assumption of mathemagenic theory is that each of these classes of behavioral responses "has topography, rate characteristics, and persistence and that these attributes can be modified or altered by certain environmental events (p. 200)."

Certain types of mathemagenic behavior are not consistent with learning objectives. Rothkopf indicates that:

> One of the most obvious cases of mathemagenic behaviors that are not consistent with training objectives is the progressive changes in reading behavior that resembles experimental extinction. Fewer and fewer words are read on each page. Paragraphs and even pages are skipped. Eventually the reader may begin to inspect the room about him or become sleepy (p. 202).

There are subtler, less obtrusive mathemagenic responses that interfere with learning and retention of material. Rothkopf has not conducted experiments to identify and measure the physiological and attentional processes that constitute mathemagenic behavior. Rather, he has concentrated on determining the effect of antecedent conditions "on the consonance of the resulting mathemagenic responses with training objectives (p. 202)."

One of the most frequently studied types of environmental control of mathemagenic responses is test-like events. The effects of such control have been identified previously (Rothkopf, 1963) with a class of activities called inspection behavior. Factual questions are inserted into learning passages and their effect is measured on tests of learning and retention. One of the central questions that have derived from this research is whether inserted questions shape effective mathemagenic behaviors (have a general effect on learning) or whether the questions themselves constitute solely practice or review events which facilitate specific learning. Variables such as the type of question (general/specific), position of questions in text (before/after material to which they relate), and continuity of questions and related content (relative distance of questions from relevant material) have been examined (Frase 1968c, 1970 summarized this research). Since studies examining the effects of these variables fall into one or more of the above three categories it was decided to organize the research to follow on a chronological basis.

Rothkopf (1965) reports a study where subjects learned most when questions come after the material to which they related. Subjects read an ordinary text where questions were inserted either before or after the material to which they related. Simple instructions to read carefully also facilitated retention in general.

Rothkopf (1966) dealt with the general questions of whether

adjunct, test-like questions have facilitating effects on learning from written instructional materials and whether it matters where the questions are asked in the course of reading. Test-like questions which were presented before the relevant text passage produced only content-specific transfer effects. Prequestions apparently limited the range of stimuli to which effective learning responses are made (Frase, 1970). Within-text questions presented after the relevant text passage facilitated both specific and general learning effects on post-reading performance. Simple instructions to read carefully were also facilitative.

Frase (1967) investigated the effects of the variables of length of passage (10, 20, or 40 lines), knowledge of results (absent or present), and position of questions (before or after), on learning of prose material. His posttest analysis dealt with relevant questions which had occurred during reading and incidental questions related to sections of prose not tested by the retention questions. Seventy-nine college undergraduates read 20 paragraphs of biographical material on William Janes under the influence of one of 12 possible treatment conditions. Presenting questions before paragraphs had the least effect on retention. When knowledge of results was available both pre- and post-questions facilitated learning. The 20 line passage was optimal for aiding retention. The placement of questions after prose passages increased the amount of information for non-questioned portions of material.

Frase indicated that for questions to have a general facilitative effect upon retention of prose material, questions should occur after passages. Since subjects were not allowed to review material, Frase rejected the hypothesis that questions work in a backward fashion - fostering the organization and rehearsal of previous material.

> (An) alternative hypothesis asserts that questions act in a forward manner optimizing "mathmegenic" behaviors on passages following the questions...(such) questions... provide a general test-taking orientation applicable to the paragraphs which follow (p. 270).

Rothkopf and Bisbicos (1967) found that the type of question may selectively reinforce the learning of different ideas within materials. Questions related to either common or technical terms were interspersed in a text. Post questioned groups which had read technical term questions demonstrated high recall of other technical terms. The authors conjectured that questions may serve as orienting stimuli which act as category cues that determine a broad class of stimuli to which a learner will respond.

Frase (1968a) found that "frequent post-questioning confirms and maintains the use of certain reading skills which are already in the repetoire of student responses (p. 188)." Since groups that received post-questions performed at a higher level than a pre-question group on the very first paragraph (before seeing any questions) it appears doubtful that post questions served as discriminitive stimuli for the learning of any mathemagenic skills.

Post questions rather than pre questions are more effective in eliciting efficient reading skills already in the repetoire of the learner. Differences between the groups on an overall post test may have been a result of the pre-questions selectively cueing learners to only question relevant material. Such a hypothesis received support in the study. Post-questioned groups retained more question irrelevant information than pre-questioned groups.

In Frase's (1968b) study, retention was highest when questions were placed after paragraphs. In addition, retention was inhibited with frequent pre-material questions, and highest with frequently posed posttest questions. Frequent questioning, either pre- or post reading, lowered incidental learning (of non-questioned material) without a corresponding increase in relevant material learning. Mathemagenic behavior appeared to be shaped or elicited by post passage questions and interfered with by frequent prequestioning.

Watts and Anderson (1971) investigated the effects of types of inserted questions on learning from prose. Three hundred high school seniors were asked one question after reading each of five 450-word paragraphs which explained five different psychological principles. Questions which required subjects to apply a principle to a new example facilitated retention more so than identical questions that repeated examples described in the text. The authors indicated that they were unsure whether those students who apparently processed text more thoroughly (new example group)

did so as a result of a forward shaping mathemagenic influence or a backward review influence.

McGraw and Grotelueschen (1972) tested for the presence of both forward and backward effects of inserted questions and determined the conditions under which each is most effective. Conditions examined were the relationship between inserted questions and subsequent questions on which facilitation was revealed and the textual distance of the material tested from the inserted questions. The effect of questions is forward when they influence the attention to material not yet read. A backward effect hypothesis suggests that facilitation is caused by a review of previously read material as a function of postquestions.

Results showed support for both forward and backward effect explanations.

> ...The initial effect of inserted questions may be forward, shaping appropriate inspection behaviors. In addition, superior performance on pages immediately after questions suggested a forward effect mediated through increased attention.
>
> Superior performance on criterion items dealing with the same section of text as the inserted questions, but constructed so as to exclude the possibility of direct transfer, suggested a review effect - the facilitation resulting from memory search initiated by the inserted questions (p. 580).

Boyd (1972) found that the presentation of two questions during the course of prose material was more facilitative than one question. Boyd did find that contrary to almost all previous research post-passage questions depressed learning performance. Boyd attributed

the finding to the amount of material covered in questions which might have overloaded subjects memory capacity and thereby have reduced their ability to learn subsequent (incidental) material.

Hiller (1974) examined the finding of Rothkopf (1966) and others that inserted post questions aids the learning of incidental material not directly related to the questions (i.e., general facilitation of mathemagenic behaviors). Specifically, Hiller examined Frase's (1970) suggestion that: "Questions are motivational stimuli. They have arousal and associative outcomes (p. 346)." Within this context, Hiller examined the relationship of arousal and task complexity to learning performance. Hiller indicates that "Hypothetically, arousal level varies with perceived question difficulty, and task complexity varies with text readability (p. 202)." Therefore, two levels of post questions difficulty and three levels of readability were employed in the experiment.

A second question of the study dealt with whether a control group of students that was told to study according to their own idiosyncratic habits (e.g., underlining, note-taking) would perform any better than a group given traditional experimental directions to read only.

On an immediate test of retention of incidental information, passive reading and idiosyncratic study were similar to each other but superior to the inserted questions treatments. The two post questioned groups (difficult and easy) performed significantly

poorer on a retention test of material of moderate and very difficult levels of readability. For the average readability lesson, only the difficult inserted post questions produced lower acquisition. No significant differences among groups were observed on a two-week test of retention.

Hiller explained that the inhibiting effects of postquestions may have been due to the lack of confidence of subjects reading the moderately difficult and very difficult lessons. In fact, immediate retention was significantly correlated with measures of self-confidence in these particular groups. Hiller concludes by indicating that debilitating test anxiety and consequent distracting emotional behaviors may have interfered with learning.

In a study by Rickards and Di Vesta (1974), eighty college sophomores answered one of four types of questions after every two or four passages of text. The rote-learning-of-facts questions were"directed at specific facts presented in subordinate sentences in the paragraphs." Rote-learning-of-ideas questions were aimed at"ideas presented in paragraphs which like the rote-learning-of-facts questions only required subjects to literally recall passage material." Meaningful-learning questions required the subjects to"organize or subsume the facts of the subordinate sentences under the ideas contained in the superordinate topic stentences of the related paragraphs (p. 355)." A fourth task-irrelevant question was totally unrelated to the passages.

When questions occurred every two paragraphs, meaningful-learning questions resulted in recall of relevant and incidental information that was equal to or greater than rote-learning-of-ideas or task-irrelevant questions. When questions occurred after every four paragraphs, only those subjects receiving rote learning of ideas and facts performed better than the control group. The authors argue that "the more thorough processing associated with meaningful-learning questions necessitated their relative closeness in text (p. 354)."

Rothkopf and Billington (1974) posed the following two questions: "(a) Do attempts to recall recently read material aid the retention of other material that is topically related to the initial recall attempts (indirect review); and (b) Is performance on a test item better if a question topically related to the test item has recently been asked (priming) (p. 669)." Evidence was provided that positively supported the first question and that negatively supported the second. Rothkopf and Billington synthesize the implications of their findings as follows:

> The data are consistent with the concept that the subject searches his memory while trying to answer an adjunct question during reading. In doing so, the subject reviews and strengthens previously established related memory representations or makes them in other ways more accessible in subsequent tests (p. 678).

As was found in the review of literature on advance organizers, it is unclear what internal processes account for the facilitating

effects of within-text questioning. Does postquestioning promote a backward review of material, elicit pro-reading mathemagenic behaviors, or both? The multiple variables investigated and the occassional divergent findings suggest the province of mathemagenic behaviors to be an extremely broad and as yet ill-defined area. It is apparent that Rothkopf's initial theory needs substantial reformulation and clarification incorporating the newer substantiated findings.

CHAPTER III

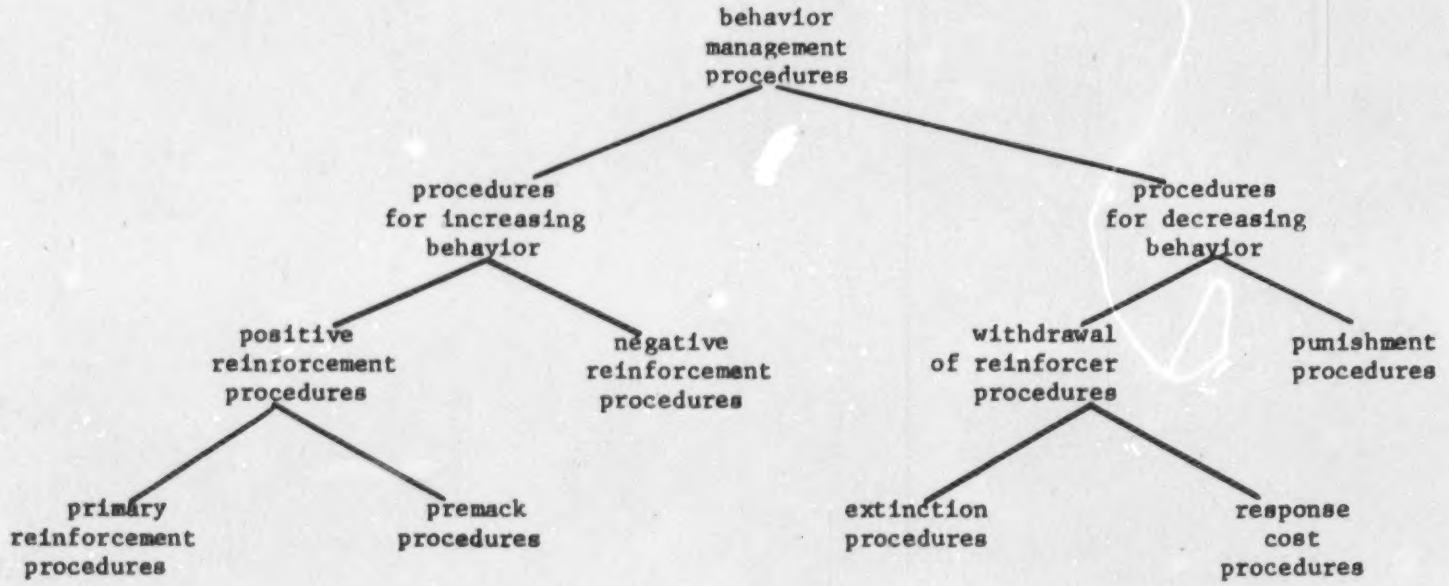
METHOD

There were several reasons for selecting behavior management concepts as the subject-matter of this experiment. First, the author had substantive and applied knowledge of this area of study. Second, the school-related concepts typically taught in many educational experiments are fairly concrete and have a finite and distinct number of visually perceptible attributes (i.e., tree, triangle). Behavior management concepts are more abstract than those having attributes less easily discriminated. It was felt that instruction of these concepts would provide a test for the generalizability of the effectiveness of single-concept instructional variables. Third, the group of behavior management concepts taught in this study are readily represented in a taxonomy. And fourth, it was felt that the material would be novel and of interest to seniors in high school.

The taxonomy of behavior management concepts is presented in Figure 5. It will be observed that the procedures are presented in an inclusive-exclusive, subsumptive arrangement. Each procedure subsumes all of the procedures directly below it. Said another way, each procedure is a subset of the class of procedures directly

Figure 5

Taxonomy of
Behavior Mangement Concepts



above it. Those classes of procedures that are higher in the taxonomy are more general than those lower in the taxonomy. The four taxonomic relationships presented in the previous chapter hold true for the behavior management taxonomy. It should be mentioned that the taxonomy is not exhaustive or complete Many other behavior management procedures could be introduced into the taxonomy (i.e., procedures for maintaining behavior, covert reinforcement procedures, stimulus satiation procedures, time-out procedures).

Development of Instructional Materials

Plan for Effective Instruction.

A Plan for Effective Instruction (Bernard, 1975) based on task analysis procedures was employed in the construction of instructional materials. A partial concept analysis of each behavior management procedure was conducted to determine relevant content objectives. Klausmeier et al. (1974a) provided the theoretical basis for determining behavioral objectives.

The terminal learning objective of the study was to facilitate the attainment of a group of behavior management concepts at the Formal level. It was felt that high school seniors were capable of attaining the behavior management concepts at this level. Previous research (e.g., Klausmeier, Sipple & Allen, 1974b) has shown a large number of ninth-grade students capable of performing the cognitive operations that are requisite for Formal level attainment.

The following eight behavior management procedures were taught: positive reinforcement procedures, primary reinforcement procedures, premack procedures, negative reinforcement procedures, withdrawal of reinforcer procedures, extinction procedures, response cost procedures, and punishment procedures. Due to time constraints, the following three general procedures that are represented in the taxonomy were not systematically taught: behavior management procedures, procedures for increasing behavior and procedures for decreasing behavior. These three procedures were alluded to and described in the advance organizers.

Partial concept analyses of the behavior management procedures identified content objectives (see Appendix A). A definition, relevant and irrelevant attributes, and matched examples and non-examples of each procedure were specified. Examples and non-examples were brief written dramatizations of an application or misapplication of a given procedure. A partial concept analysis of negative reinforcement procedures is presented in table 4. No principles or problem-solving situations were provided in any of the concept analyses.

The following books were used in identifying the definition, attributes, examples, and non-examples of each procedure: B. Sulzer and G. R. Mayer (1972), Behavior Modification Procedures for School Personnel; N. K. Buckley and H. M. Walker (1970), Modifying Classroom Behavior, A Manual of Procedure for Classroom

Table 4

Partial Concept Analysis
of Negative Reinforcement Procedures

Definition: A negative is removed immediately after and every time a person's behavior occurs. This procedure results in an increase in the number of times a person's behavior occurs.

Relevant Attributes:

1. the procedure results in an increase in the number of times a person's behavior occurs.
2. A negative is removed.
3. A negative is removed immediately after the person's behavior occurs.
4. A negative is removed every time the person's behavior occurs.

Irrelevant Attributes:

1. Kind of negative removed.
2. Characteristics of person removing negative.
3. Characteristics of person whose behavior increases.
4. Kind of behavior that increases.

Matched Examples (a.) and Nonexamples (b.):

1.

a. Rick's teacher, Ms. King, seemed to always pick on Rick for things he was doing or she imagined he was doing. Rick found that each time he left Ms. King's class to get a drink of water he could avoid being yelled at. During the school year, Rick increased the number of trips he made to the fountain.

Table 4 (continued)

b. Wilma's teacher, Mr. Merlo, rarely had anything nice to say to Wilma. The school's guidance counselor told Wilma that she could probably make Mr. Merlo more friendly by asking questions in class that showed she was interested in what he was teaching. Doubtful, Wilma tried this approach and to her surprise found that Mr. Merlo became increasingly more friendly.

2.

a. Each person in the Richard's family had eight chores they were responsible for doing every week. Everyone did them except for Tim who generally refused to do any of them. Tim's mother and father tried talking to Tim and even took away special priviledges but nothing seemed to work. One week, Tim had managed to complete three chores. His father said: "From now on, if you do any three chores, you don't have to do any more." Relieved that he didn't have to do what he considered an impossible number of chores, Tim started to do three chores every week. Over the next weeks, Tim's father was able to increase the number of chores Tim did from three to seven by increasing the number of chores Tim was expected to do before excusing him from doing the rest.

b. The Morrison's were a very well organized family. Every member knew exactly what things they were responsible for doing and did them. All except Karen. Karen refused doing her chores on the grounds that she had far too many other more important things to do. One day Karen's mother told her that at the beginning of each week she could pick out three chores to do and wouldn't have to do any more. Karen's parents tried this approach for three weeks and at the end of that time found that it didn't work. Karen still refused to do any work.

Table 4 (continued)

3.

a. Ann was a new second grade student. Ann would generally sit facing the wall and would not pay attention in class. Mr. Patterson, the guidance counselor, had worked with other children with problem's similar to Ann's and had found the following approach very successful. He had installed in his office a loud, piercing, highly-disturbing, whistle which he could turn on and off from behind his desk. Each time Ann walked into Mr. Patterson's office, the whistle would already be turned on. When she turned to face Mr. Patterson, he would turn off the whistle. At the beginning of every meeting, Mr. Patterson would wait for Ann to turn towards him before he would turn the whistle off. Since Ann really hated to hear the whistle, she began to sit and face Mr. Patterson much more often than before Mr. Patterson began using the whistle device.

b. Art was referred to the school psychologist because he always faced away from his teacher during class. The psychologist tried a procedure where every time Art would walk into his office he would hear a loud, disturbing whistle. Every visit the psychologist would wait until Art turned to face her before turning the whistle off. Since Art really liked the sound of the psychologist's whistle (it reminded him of trains), he did not increase the number of times he faced the school psychologist.

Teachers; W. C. Becker, S. Engelman, and D. R. Thomas (1971), Teaching: A Course in Applied Psychology; W. I. Gardner (1971), Behavior Modification in Mental Retardardation.

Klausmeier et al. (1974a) has pinpointed the following three cognitive operations (behaviors) as being necessary for mastery of a concept at the Formal level: a) generalizing that two or more examples of a concept are members of the same class, b) discriminating the relevant and irrelevant attributes of the concept, and c) differentiating between examples and nonexamples of concepts in terms of defining attributes. These behaviors served as the behavioral objectives of the instructional lessons.

The following single-concept instructional variables were employed in the instructional lessons. The variables result from an instructional analysis of the content and behavioral objectives. That is, a review of the concept teaching literature suggested that these variables would permit the learner to attain the specified content and behavioral objectives.

1. concept definition
2. attribute definition
3. attribute emphasis
4. rational set
5. concept set

Construction of Instructional Lessons

Three different instructional lessons utilizing the five

single-concept instructional variables identified in the instructional analysis were constructed. The first instructional lesson contained 11 pages and taught positive reinforcement procedures and primary reinforcement procedures. The first page of the lesson introduced and defined important terminology that was used throughout the three lessons (important property, example, nonexample, reinforcer). A definition of the first procedure and its' attributes was then presented. A rational set of divergent examples and convergent examples and nonexamples immediately followed. Attribute emphasis took the form of an explanation as to why a written dramatization was or was not an example of a certain procedure. A definition of the second procedure, a definition of each relevant attribute, a rational set of divergent examples and convergent examples and nonexamples, and attribute emphasis, was then presented in similar fashion (see Appendix B, lesson one).

The second and third instructional lessons, each containing 14 pages, were constructed along similar lines using the same progression of teaching variables. The second instructional lesson taught premack procedures, negative reinforcement procedures, and punishment procedures. Withdrawal of reinforcer procedures, extinction procedures, and response cost procedures, were taught in the third instructional lesson. Both the second and third lessons began with a one page review of the procedures taught in the previous lesson.

Three "high interest" articles that appeared in popular

magazines served as placebo material. The material which was unrelated to the subject-matter domain used in the study dealt with the following three topics in the area of psychology: 'Learning Disabilities,' 'Obedience and Human Nature,' and 'The Future of the American Family.'

Advance Organizers

Three different advance organizers that were developed presented the organization of and relationships among the procedures taught in each of the three lessons (see Appendix C). The first organizer (301 words) described the nature of a taxonomy of concepts indicating specific relationships that exist within a taxonomy. The nature and purpose of behavior management procedures, procedures for increasing behavior, and procedures for decreasing behavior was briefly discussed. Through the use of a tree diagram, the inclusive-exclusive relationships among these classes of procedures were elaborated. Positive reinforcement procedures and primary reinforcement procedures were then added to the diagram of the taxonomy and their relationships with the three more general procedures were pointed out.

The second and third advance organizer (193 and 146 words, respectively) were parallel in form. The first part of each organizer presented a tree diagram of the three most general procedures in the taxonomy as well as those procedures taught in the previous lesson(s). The procedures to be taught in the subsequent lesson were then added to the tree diagram and relationships of the new procedures with the

previously presented procedures were discussed.

It was felt by this author that by preceding each lesson with a presentation of the relationships among the procedures in written and pictorial form, the highly similar material in the lessons would be initially more discriminable and would retain its' distinctiveness after the initial period of acquisition.

Within-Text Questions

As was mentioned, two types of questions were inserted within the three instructional lessons. Attributing prompting questions served as a hypothesis-testing strategy. Subjects who were assigned to an attribute prompting question group were asked to answer a series of questions before deciding (hypothesizing) whether a specific dramatization of a procedure was or was not an example of the procedure.

As can be seen in tables 5 and 6, the questions dealt with the relevant attributes of the procedure. As was exaplained in the lesson, if all relevant attributes of a procedure were present in the dramatization (if each question could be answered with a YES), then the dramatization was an example. If one or more relevant attributes was not in evidence, then the dramatization was a nonexample.

It was hoped that attribute prompting questions would elicit a more careful reading of examples and nonexamples (dramatizations) and, through active repetition, foster greater retention of the relevant attributes of each of the procedures. Within the rational

Table 5

Attribute Prompting Questions Following
a Matched Example and Nonexample

Remember, if all four important properties are contained in the procedure, then it is an example of a *negative reinforcement procedure*. If you answer NO to one or more questions, it is not an example.

a. Rick's teacher, Ms. King, seemed to always pick on Rick for things he was doing or she imagined he was doing. Rick found that each time he left Ms. King's class to get a drink of water he could avoid being yelled at. During the school year, Rick increased the number trips he made to the fountain.

1.	Does the procedure result in an increase in the number of times a person's behavior occurs?	YES	NO	
2.	Is a negative removed?	YES	NO	
3.	Is a negative removed immediately after a behavior occurs?	YES	NO	Is this an example of a negative reinforcement procedure?
4.	Is a negative removed every-time the behavior occurs?	YES	NO	YES NO

Table 5 (continued)

b. Wilma's teacher, Mr. Merlo, rarely had anything nice to say to Wilma. The school's guidance counselor told Wilma that she could probably make Mr. Merlo more friendly by asking questions in class that showed she was interested in what he was teaching. Doubtful, Wilma tried this approach and to her surprise found that Mr. Merlo became increasingly more friendly.

1.	Does the procedure result in an increase in the number of times a person's behavior occurs?	YES	NO	
2.	Is a negative removed?	YES	NO	
3.	Is a negative removed immediately after a behavior occurs?	YES	NO	Is this an example of a negative reinforcement procedure?
4.	Is a negative removed every-time the behavior occurs?	YES	NO	YES NO

Table 6

Answers and Explanations to
Attribute Prompting Questions

a.

1. Does the procedure result in an increase in the number of times a person's behavior occurs? YES (NO)
2. Is a negative removed? (YES) NO (doing the rest of the
3. Is a negative removed immediately after a behavior occurs? YES (NO) chores)
4. Is a negative removed every-time the behavior occurs? YES (NO)

Is this an example of a negative reinforcement procedure? YES (NO)

The problem here is that the negative of not having to do the chores is <u>not</u> removed immediately after Karen did the three chores. For this to be an example, the negative should have been removed after Karen did the chores instead of being told at the beginning of the week that she only had to do three.

1. Does the procedure result in an increase in the number of times a person's behavior occurs? (YES) NO (doing chores)
2. Is a negative removed? (YES) NO
3. Is a negative removed immediately after a behavior occurs? (YES) NO
4. Is a negative removed every-time the behavior occurs? (YES) NO

Is this an example of a negative reinforcement procedure? (YES) NO

While this procedure has been used often by students to change the behavior of a teacher, it is not a *negative reinforcement procedure*. No negative is being removed following Wilma's behavior (asking questions).

set of examples and nonexamples for each procedure, attribute prompting questions were faded after several repetitions. That is, starting with the second instructional lesson, attribute prompting questions were dropped after being presented following each of two matched examples and nonexamples. For the third matched example and nonexample of each procedure, subjects were instructed to ask themselves whether each relevant property of the procedure was present before deciding whether a dramatization was an example or nonexample. In this case, subjects had to recall the relevant attributes rather than solely discriminate them as they had to when the questions were present.

Multiple-choice relational questions dealt with supraordinate-coordinate-subordinate relationships among the concepts in the taxonomy. Figure 6 shows that taxonomy of behavior management procedures can be broken down into four units each of which represents a taxonomy. Since no lesson dealt directly with the three most general procedures in the taxonomy, the highest unit is not included. Within each unit, the four supraordinate-coordinate-subordinate relationships hold. For example, some but not all withdrawal of reinforcer procedures are extinction procedures. No extinction procedures are also response cost procedures. All response cost procedures are also withdrawal of reinforcer procedures. Withdrawal of reinforcer procedures are either extinction procedures or response cost procedures (given the present taxonomy).

Immediately following the instruction of the three procedures

Figure 6

Supraordinate-Coordinate-Subordinate Units
Within the Concept Taxonomy

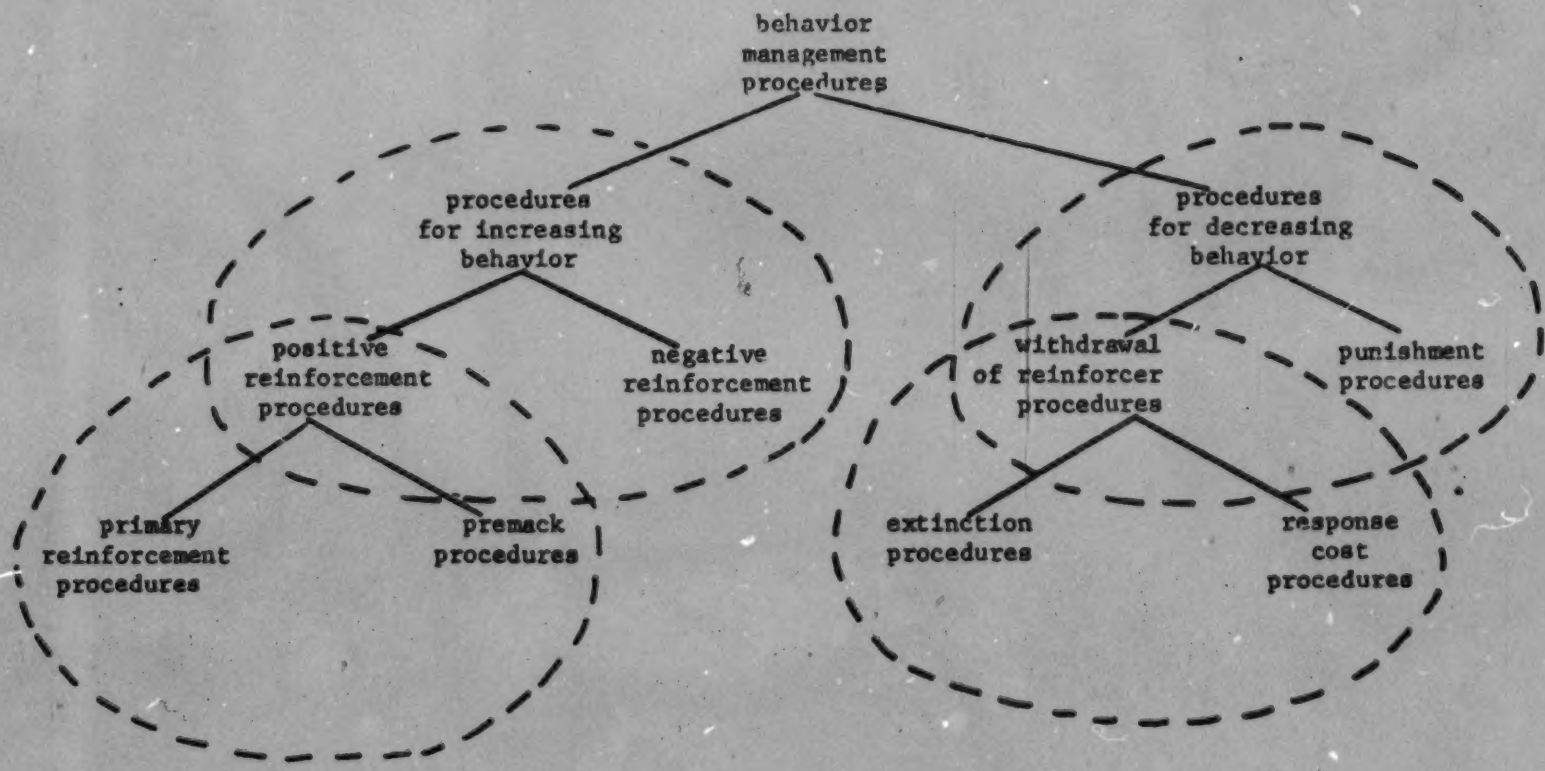


Table 7

Relational Questions

Today you have learned about *withdrawal of reinforcer procedures*, *extinction procedures*, and *response cost procedures*. There are certain relationships that exist among these three procedures. By answering the following questions, these relationships will become clearer. The answers appear on the following page.

1. Are all withdrawal of reinforcer procedures either extinction procedures, or response cost procedures?

   a. Yes, all of them are either extinction procedures or response cost procedures.

   b. No, only some of them are either extinction procedures or response cost procedures.

   c. No, none of them are either extinction procedures or response cost procedures.

2. Are all withdrawal of reinforcer procedures also response cost procedures?

   a. Yes, all of them are response cost procedures.

   b. No, none of them are response cost procedures.

   c. No, only some of them are response cost procedures.

3. Are all extinction procedures also withdrawal of reinforcer procedures?

   a. No, none of them are withdrawal of reinforcer procedures.

   b. No, only some of them are withdrawal of reinforcer procedures.

   c. Yes, all of them are withdrawal of reinforcer procedures.

4. Are all extinction procedures also response cost procedures?

   a. No, none of them are response cost procedures.

   b. Yes, all of them are response cost procedures.

   c. No, only some of them are response cost procedures.

Table 8

Answers and Explanations
to Relational Questions

Here are the answers.

1. Are all withdrawal of reinforcer procedures either extinction procedures or response cost procedures?

   a. Yes, all of them are either extinction procedures or response cost procedures.

   Withdrawal of reinforcer procedures are composed of two subsets: extinction procedures and response cost procedures.

2. Are all withdrawal of reinforcer procedures also response cost procedures?

   c. No, only some of them are response cost procedures.

   The more general set of withdrawal of reinforcer procedures is also made up of the subset of extinction procedures.

3. Are all extinction procedures also withdrawal of reinforcer procedures?

   c. Yes, all of them are withdrawal of reinforcer procedures.

4. Are all extinction procedures also response cost procedures?

   a. No, none of them are response cost procedures.

   They are different procedures. One involves having someone pay a fine while the other involves taking away a reinforcer that was previously given.

in each of the units, four statements of the relationships among the procedures were presented in the instructional lessons. The statements were occasionally accompanied by a one or two sentence explanation. Subjects in the relational question experimental groups received four questions and feedback instead of the four statements. Examples of relational questions and answers and explanations which appeared on the following page in the lesson are presented in tables 7 and 8. The feedback provided the correct answer (a statement of the relationship) as well as occasional explanation. The feedback page contained precisely the same information as the page in the instructional lesson (without relational questions) which contained the four statements of the relationships.

When attribute prompting questions were inserted into the three instructional lessons, the length of the lessons became, respectively, 16, 23, and 23 pages. The three instructional lessons containing relational questions had 11, 16, and 16 pages, respectively. A second instructional lesson containing attribute prompting questions and a third instructional lesson that had relational questions inserted are presented in Appendix B.

Development of Assessment Measures

Three measures were constructed to assess mastery of the instructional material. The Concept Mastery Test (CMT) contained five subtests and assessed the attainment of the eight behavior management concepts at the Formal level (see Appendix D). The CMT used in the

study proper (revised from pilot) contained 34 multiple-choice questions. Twelve questions measured the ability to classify examples and nonexamples of the behavior management concepts (Classification Subtest). Discrimination of the relevant attributes of the concepts was tested in four questions (Discrimination Subtest). Four questions determined whether subjects could correctly label the relevant attributes (Labelling Subtest). Subjects ability to evaluate examples and nonexamples of each concept on the basis of defining attributes was assessed using six items (Evaluation Subtest). Eight items determined whether subjects could recognize the definition of each concept (Definition Subtest).

The Understanding Relationships Test (URT) assessed knowledge of the four supraordinate-coordinate-subordinate relationshps that exist among the concepts in the taxonomy of behavior management concepts. The URT contained a total of 24 multiple-choice questions. Eight questions assessed understanding of each of the following two relationships: "Some but not all members of a supraordinate class belong to a given subordinate class," and "All members of a subordinate class are also members of a supraordinate class." Understanding of the following two relationshps was assessed using four questions for each relationship: "The sum of the members of the subordinate classes equals the sum of the members of the supraordinate class," and "the members of one coordinate class are not members of another coordinate class." The questions used in the URT were the same as the relational questions inserted within certain of the lessons (see Appendix D).

The Concept Taxonomy Test (CTxT) measured the ability to

recognize the position of each concept within the taxonomy (see Appendix D). A fill-in-the-blank, multiple-choice procedure was utilized. Subjects were first given an introduction to the nature of a taxonomy. The inclusive-exclusive relationships among members of a taxonomy were explained. A taxonomy of kinds of transportation was presented as practice. Four of the eleven kinds of transportation were omitted in the tree diagram of the transportation taxonomy. Subjects had to select from a list of words that word which best filled the omitted place in the diagram of the taxonomy.

A tree diagram of the taxonomy of behavior management concepts was then presented with six of the eleven taxonomic positions being left unfilled. For each unfilled position, subjects had to select from a list of closely related procedures that procedure which was appropriate to fill the omitted position. Six multiple-choice questions constituted the CTxT.

Pilot Study

Purpose

The pilot study served two main functions. The first was to evaluate the instructional lessons. Concern was with the length, readability, comprehensibility, and instructional format of the lessons. Since the written dramatizations that were used in the lessons were in some cases extremely provocative and in other cases potentially boring, the affect of the subjects to the dramatizations and to the lesson as a whole was also deemed important to determine.

The second function of the pilot was to validate the three assessment measures. The three assessment measures were administered to a group of subjects who had received three instructional lessons. The reliabilities and difficulty levels of each test item was to provide a basis for improving the measures. The readability and length of the three assessment measures was also investigated.

Subjects

Lessons and assessment measures were administered to 30 twelfth-grade students. The twelfth-grade students were enrolled in two Family Life classes in a large midwestern high school.

Procedure

The initial procedure that was planned called for half the subjects in each class to receive the three instructional lessons that employed the five single-concept instructional variables. The other half was to receive the same lessons with attribute prompting and relational questions inserted and preceded by advance organizers. The three lessons were to be administered, one per day, for three consecutive days. On the fourth day, all subjects were to receive the three assessment measures.

Due to an untimely snowstorm, the initial plan for the pilot had to be abandoned. On the first day of the pilot, half the subjects did read the lesson containing the five single-concept instructional variables while the other half read the lesson containing an advance organizer and within-text questions. On the second day, however, half the subjects in their respective groups read lesson

two while the other half read lesson three. On the final day of the pilot, subjects were administered only those questions in each of the three assessment measures which related to the instructional material they had received. On each day of the pilot, subjects were asked to provide candid written evaluative feedback on the substance of the lessons and assessment measures.

Results

The pilot subjects provided valuable 'subjective' information concerning the three lessons. Except for the fact that the subjects felt the lessons were too long and repetitive, the general reaction to the lessons was favorable. As a result of their feedback, the following changes were made:

1. To reduce the length and repetitiveness of the lessons, one matched example and nonexample used in teaching each behavior management concept was eliminated.

2. To further reduce the length of the lessons, it was decided to include only one of the two kinds of within-text questions in any of the lessons.

3. The idea that classes of concepts lower in a taxonomy are subsets of those higher in a taxonomy was introduced in the advance organizers and in the explanations to the relational questions.

4. Ambiguities in the written dramatizations of each procedure were corrected.

5. Several subjects indicated that they were being "talked down to" when a procedure was dramatized in a situation with young children. As a result, two statements were inserted in the introduction to each of two procedures indicating that the procedure was generally used with younger children.

Due to a high rate of absenteeism (10 over the three days),

to a large number of late arrivals on the day that the assessment measures were administered, and to the abbreviated nature of the pilot, it was decided that no useful item reliability information would ensue from an item analysis. The percentage of subjects who correctly answered each question on the Concept Mastery Test was calculated. Those questions that more than 90 percent of the subjects answered correctly were eliminated. Specifically, two questions that measured the ability to discriminate the relevant attributes of the concepts and two questions requiring subjects to evaluate examples and nonexamples of each concept on the basis of relevant attributes were dropped. These four questions were readily answered from a careful reading of the questions. Four questions that measured the ability to classify examples and nonexamples of each concept were added to the CMT. For those questions that were correctly answered by less than ten percent of the subjects, modifications were made in either the wording of the written dramatization on which the questions were based, or in one or more of the multiple-choice alternatives. No changes in the Understanding Relationships Test or Concept Taxonomy Test were made.

Main Study

Hypotheses

The following hypotheses were examined in this study:

1. Subjects who receive instructional lessons containing single-concept instructional variables will perform significantly better on the Concept Mastery Test,

Understanding Relationships Test, and Concept Taxonomy Test than subjects who receive placebo material.

2. Subjects who receive advance organizers preceding instructional lessons will perform significantly better on the Concept Mastery Test, Understanding Relationships Test, and Concept Taxonomy Test, than subjects who receive instructional lessons without advance organizers.
3. Subjects who receive instructional lessons with attribute prompting questions inserted will perform significantly better on the Concept Mastery Test than subjects who receive instructional lessons without attribute prompting questions.
4. Subjects who receive instructional lessons containing relational questions will perform significantly better on the Understanding Relationships Test and Concept Taxonomy Test than subjects who receive instructional lessons without relational questions.
5. Performance on the Understanding Relationships Test and Concept Taxonomy Test will be positively correlated with performance on the Concept Mastery Test.

Experimental Design

Eight experimental groups were employed in the study (see table 9). Six of the groups were represented in a 2 x 3 factorial design. The two factors were advance organizer (presence or absence)

Table 9

Design of Study*

	Within-Text Questions		
Advance Organizer	relational	attribute prompting	no questions
present			
absent			

Instructional Lessons	Control Group (placebo material)

* All six groups in 2 x 3 factorial design received instructional lessons incorporating five single-concept instructional variables. Advance organizers and Within-Text Questions were added to the instructional lessons according to the requirements of the design.

and type of within-text questions (attribute prompting questions, relational questions, and no questions). The two experimental factors of advance organizer and within-text questions were systematically varied across and incorporated within the three instructional lessons according to the requirements of the design. A seventh experimental group received the three instructional lessons (without questions and organizers) while the eighth group received placebo material.

Statistical Analyses

Eight t-tests comparing the performance of the group receiving placebo material with the group receiving the three instructional lessons on the Concept Mastery Test, the five Concept Mastery Subtests, Understanding Relationships Test, and Concept Taxonomy Test were conducted in examining the first hypothesis.

The second, third and fourth hypotheses were tested by performing two-way analysis of variance F-tests on the scores obtained from the three-assessment measures. Where tests of the main effect of either factor proved significant, Tukey post-hoc comparisons were performed. With 26 subjects per cell, the main effect of advance organizer was tested with power of .80, alpha of .05, to detect a .39 standard deviation of difference between groups. For testing the main effect of within-text questions and for an interaction, power was set at .80, alpha at .05, to detect a .65 standard deviation between groups.

In examining the fifth hypothesis, a correlation coefficient was computed in comparing performance on the Concept Mastery Test with performance on the Understanding Relationships Test and Concept Taxonomy Test.

Subjects

Two hundred and eight high school senior students (76 males, 132 females) participated in the study. The students were enrolled in nine psychology classes. One class of 17 volunteer students also participated. The 10 classes were drawn from three high schools located in three different rural, midwestern communities. In one of the high schools, almost all of the 65 students who participated in the study were planning to attend college when they graduated. In the other two high schools, approximately half of the students had plans to attend college. The study began with 243 students. Thirty-five students were absent during one or more days of the study and were eliminated from the sample.

Procedure

Students from the 10 classrooms were randomly assigned to one of the eight experimental groups. On the first three consecutive days of the experiment, students read to themselves the instructional lessons or placebo material. On the fourth consecutive day, the three assessment measures were administered.

On the first day of the experiment, the students were given an overview as to the purpose of the study (see Appendix E). Instructions and procedures for completing the lessons were also provided. A reminder of the important points were reviewed on the following two days.

Questions concerning procedure that arose during the experiment were answered by the experimenter. No explanations concerning the

content of the lessons was provided.

The sequence in which the assessment measures were distributed was: CMT, URT, CTxT. As soon as a student had completed one of the tests, the test was collected, and the subsequent test was given.

CHAPTER IV

RESULTS

The performance of the eight experimental groups on the Concept Mastery Test, Understanding Relationships Test, and Concept Taxonomy Test will now be reported and compared. In addition, the performance of the eight groups on the five subtests of the Concept Mastery Test will be analyzed. It is felt that providing this information will permit a greater understanding of the effects of the independent variables on the different cognitive behaviors that underly attainment of concepts.

The following Hoyt reliabilities which are measures of the internal consistency of a test across items are reported for each of the three assessment measures: Concept Mastery Test (.87), Understanding Relationships Test (.82), and Concept Taxonomy Test (.68). The reliabilites of the subtests of the CMT are as follows: Classification Subtest (.72), Discrimination Subtest (.39), Labelling Subtest (.50), Evaluation Subtest (.48), and Definition Subtest (.69).

The means and standard deviations of the group receiving placebo material and of the group receiving the instructional lessons (no advance organizer, no within-text questions) are presented in table 10. T-values and levels of significance are also reported. The results of t-tests comparing the performance of these two groups indicate that the group receiving the instructional lessons performed significantly better on the three assessment measures and five subtests than did the group that received placebo material (Concept Mastery Test, $t = 5.70$, $p < .01$; Classification Subtest, $t = 3.72$, $p < .01$; Discrimination Subtest, $t = 2.94$, $p < .01$; Labelling Subtest, $t = 3.24$, $p < .01$; Evaluation Subtest, $t = 3.98$, $p < .01$; Definition Subtest, $t = 4.48$, $p < .01$; Understanding Relationships Test, $t = 4.76$, $p < .01$; Concept Taxonomy Test, $t = 2.51$, $p < .05$).

The means and within-cell standard deviations of the six experimental groups (factorial groups) represented in the 2 x 3 factorial design are presented in the odd numbered tables 11-26. The combined means and pooled standard deviations are also provided in this set of tables. Tukey's pair-wise comparisons were performed using the three within-text questions means that were combined across the two levels of the advance organizer factor. Since the advance organizer factor had only two levels, no Tukey comparisons using the combined advance organizer means were appropriate. Results of the analysis of variance tests for scores on the eight assessment tests and

Table 10

Means, Standard Deviations, t-values, and Significance Levels of the Group Receiving Instructional Lessons and the Group Receiving Placebo Material

Group	Concept Mastery Test (34 items)	Classification Subtest (12 items)	Discrimination Subtest (4 items)	Labelling Subtest (4 items)
Instructional Lessons	17.69 (5.50)	5.50 (2.79)	2.38 (0.80)	2.15 (0.97)
Placebo Material	10.12 (3.95)	3.19 (1.50)	1.65 (0.98)	1.27 (1.00)
t-value	5.70	3.12	2.94	3.24
Significance Level	.01	.01	.01	.01

Table 10 (continued)

Group	Evaluation Subtest (6 items)	Definition Subtest (8 items)	Understanding Relationships Test (24 items)	Concept Taxonomy Test (6 items)
Instructional Lessons	3.35 (1.16)	4.31 (2.15)	11.50 (4.53)	2.88 (1.66)
Placebo Material	1.96 (1.34)	2.04 (1.43)	6.31 (3.22)	1.88 (1.18)
t-value	3.98	4.48	4.76	2.51
Significance Level	.01	.01	.01	.05

subtests are reported in the even numbered tables 12-26.

Concept Mastery Test

Means, combined means, standard deviations, and pooled standard deviations for each cell in the 2 x 3 factorial design are presented in table 11. Results of the analysis of variance reported in table 12 reveal a main effect of advance organizer ($F = 10.98$, $df = $ [illegible], $p < .01$) and within-text questions ($F = 28.94$, $df = 2,150$, $p < .01$). Interaction effects were found to be nonsignificant ($F = 1.18$, $df = 2,150$, $p < .31$). When Tukey pair-wise comparisons were conducted, significant differences between the combined mean of the groups receiving attribute prompting questions and the combined mean of the groups receiving relational questions was observed (HSD = 2.82, $p < .01$). Significant differences between the "attribute prompting question" groups and the "no question" groups was also found (HSD = 2.82, $p < .01$). No significant differences between the "relational questions" groups and the "no question" groups was found.

Classificatory Subtest. Table 13 presents the performance of the six factorial groups on the Classificatory Subtest. The analysis of variance presented in table 14 reveals a main effect of advance organizer ($F = 5.68$, $df = 1,150$, $p < .05$) and within-text questions ($F = 25.34$, $df = 2,150$, $p < .01$). Interaction effects were non-significant ($F = .36$, $df = 2,150$, $p < .70$).

The groups receiving attribute prompting questions performed significantly better than either of the other two combined groups

Table 11

Means and Standard Deviations*

Concept Mastery Test

	Attribute Prompting Questions	Relational Questions	No Questions	Combined
Advance Organizer	26.46 (5.30)	22.35 (4.72)	20.69 (4.89)	23.17 (5.48)
No Advance Organizer	25.54 (3.83)	18.65 (4.88)	17.54 (5.50)	20.58 (5.92)
Combined	26.00 (4.60)	20.50 (5.10)	19.12 (5.39)	

* n = 26, standard deviations in parentheses.

Table 12

Two Way Analysis of Variance

Concept Mastery Test

Source	df	MS	F
Advance Organizer	1	261.56	10.98*
Within-Text Questions	2	689.56	28.94*
Interaction	2	28.03	1.18
Error	150	28.83	

* $p < .01$

Table 13

Means and Standard Deviations*

Classificatory Subtest

	Attribute Prompting Questions	Relational Questions	No Questions	Combined
Advance Organizer	9.42 (2.23)	7.15 (2.41)	6.42 (2.10)	7.67 (2.57)
No Advance Organizer	8.65 (2.08)	5.89 (2.25)	5.89 (2.41)	6.81 (2.58)
Combined	9.04 (2.17)	6.52 (2.40)	6.15 (2.25)	

* n=26, standard deviations in parentheses

Table 14

Two Way Analysis of Variance

Classificatory Subtest

Source	df	MS	F
Advance Organizer	1	28.78	5.68**
Within-Text Questions	2	128.28	25.34*
Interaction	2	1.81	.36
Error	150	5.06	

* $p < .01$

** $p < .05$

(HSD = 1.30, $p < .01$). No difference between the "relational question" groups and the "no question" groups was found.

Discrimination Subtest. Means and standards deviations of each factorial group on the Discrimination Subtest are reported in table 15. Table 16 presents the results of the analysis of variance. Main effects of advance organizer ($F = 4.54$, $df = 1$, $p < .05$) and within-text questions ($F = 5.21$, $df = 2,150$, $p < .01$) were found to be significant. The interaction effect was not ($F = 1.14$, $df = 2,150$, $p < .32$).

No difference between the combined mean of the groups receiving relational questions and the combined mean of the groups that did not receive questions was found. The "attribute prompting question" combined mean was significantly larger than the "relational question" combined mean and the "no question" combined mean (HSD = .50, $p < .01$).

Labelling Subtest. Table 17 presents the means and standard deviations of the six factorial groups and combined groups. Results from the analysis of variance reported in table 18 indicate a main effect of advance organizer ($F = 8.78$, $df = 1,150$, $p < .01$) and within-text questions ($F = 7.21$, $df = 2,150$, $p < .01$). The interaction effect was not significant ($F = 1.14$, df = 2,150, $p < .32$).

Tukey's pair-wise comparisons revealed that the "attribute prompting question" groups performed significantly better than either of the other two groups (HSD = 0.67, $p < .01$). No differences were observed between the groups receiving relational questions and the groups that did not receive any questions.

Table 15

Means and Standard Deviations*

Discrimination Subtest

	Attribute Prompting Questions	Relational Questions	No Questions	Combined
Advance Organizer	3.12 (1.03)	2.89 (0.77)	2.85 (0.78)	2.95 (0.87)
No Advance Organizer	3.12 (0.59)	2.46 (0.99)	2.39 (0.94)	2.65 (0.91)
Combined	3.12 (0.83)	2.67 (0.90)	2.62 (0.89)	

* n = 26, standard deviations in parentheses

Table 16

Two Way Analysis of Variance

Discrimination Subtest

Source	df	MS	F
Advance Organizer	1	3.39	4.54**
Within-Text Questions	2	3.89	5.21*
Interaction	2	0.85	1.14
Error	150	5.06	

* $p < .01$

** $p < .05$

Table 17

Means and Standard Deviations*

Labelling Subtest

	Attribute Prompting Questions	Relational Questions	No Questions	Combined
Advance Organizer	3.08 (0.89)	2.69 (1.32)	2.58 (1.33)	2.78 (1.20)
No Advance Organizer	2.92 (0.97)	1.96 (1.18)	1.81 (1.20)	2.23 (1.22)
Combined	3.00 (0.93)	2.33 (1.29)	2.19 (1.31)	

* n = 26, standard deviations in parentheses

Table 18

Two Way Analysis of Variance

Labelling Subtest

Source	df	MS	F
Advance Organizer	1	11.85	8.78*
Within-Text Questions	2	9.73	7.21*
Interaction	2	1.54	1.14
Error	150	1.35	

* $p < .01$

Evaluation Subtest. Table 19 presents the means, combined means, standard deviations, and pooled standard deviations of scores on the Evaluation Subtest. The analysis of variance reported in table 20 indicates a main effect of advance organizer ($F = 4.30$, $df = 1,150$, $p < .05$) and within-text questions ($F = 17.05$, $df = 2.150$, $p < .01$). No significant interaction was found ($F = 0.41$, $df = 2,150$, $p < .67$).

Of the three pairwise comparisons among combined means, the only significant difference was found between the groups receiving attribute prompting questions and the groups that did not receive questions (HSD = 1.30, $p < .01$).

Definition Subtest. The performance of the six factorial groups on the Definition Subtest is presented in table 21. The results of the analysis of variance reported in table 22 reveal a main effect of within-text questions ($F = 9.63$, $df = 2,150$, $p < .01$). The main effect of advance organizer approached significance ($F = 3.55$, $df = 1,150$, $p < .06$). No interaction effect was observed ($F = 1.56$, $df = 2,150$, $p < .21$).

The .90 point difference between the combined "attribute prompting question" mean and the combined "relational question" mean proved significant (HSD = 0.75, $p < .05$). The 1.37 point difference between the combined "attribute prompting questions" mean and combined "no question" mean was also significant (HSD = 0.93, $p < .01$). The .46 point difference between the groups receiving relational questions and the groups that received no questions was not significant.

Table 19

Means and Standard Deviations*

Evaluation Subtest

	Attribute Prompting Questions	Relational Questions	No Questions	Combined
Advance Organizer	4.73 (1.08)	3.96 (1.04)	3.58 (1.27)	4.09 (1.22)
No Advance Organizer	4.58 (0.99)	3.42 (1.39)	3.08 (1.35)	3.69 (1.40)
Combined	4.65 (1.03)	3.69 (1.25)	3.33 (1.32)	

* n = 26, standard deviations in parentheses

Table 20

Two Way Analysis of Variance

Evaluation Subtest

Source	df	MS	F
Advance Organizer	1	6.16	4.30**
Within-Text Questions	2	24.43	17.05*
Interaction	2	0.58	0.41
Error	150	1.43	

* $p < .01$

** $p < .05$

Table 21

Means and Standard Deviations*

Definition Subtest

	Attribute Prompting Questions	Relational Questions	No Questions	Combined
Advance Organizer	6.12 (1.63)	5.65 (1.44)	5.27 (1.28)	5.68 (1.48)
No Advance Organizer	6.27 (1.31)	4.92 (1.81)	4.38 (2.06)	5.19 (1.91)
Combined	6.19 (1.47)	5.29 (1.66)	4.83 (1.76)	

* n = 26, standard deviations in parentheses

Table 22

Two Way Analysis of Variance

Definition Subtest

Source	df	MS	F
Advance Organizer	1	9.26	3.55
Within-Text Questions	2	25.08	9.63*
Interaction	2	4.08	1.56
Error	150	2.61	

* $p < .01$

Understanding Relationships Test

The means, combined means, standard deviations, and pooled standard deviations for the Understanding Relationships Test are presented in table 23. The results of the analysis of variance reported in table 24 indicate a main effect of both advance organizer ($F = 10.02$, $df = 1,150$, $p < .01$) and within-text questions ($F = 11.25$, $df = 2,150$, $p < .01$). The interaction effect was not found to be significant ($F = 1.10$, $df = 2,150$, $p < .34$).

The combined mean of the "attribute prompting question" groups was significantly larger than the combined mean of the "no question" groups (HSD = 1.89, $p < .05$). The combined mean for the "relational question" groups was also larger than the combined mean for the "no question" groups (HSD = 2.35, $p < .01$). The difference between the remaining two groups was not significant.

Concept Taxonomy Test

Subject performance on the Concept Taxonomy Test is summarized in table 25. The analysis of variance results presented in table 26 indicate a main effect of both advance organizer ($F = 40.50$, $df = 1,150$, $p < .01$) and within-text questions ($F = 3.59$, $df = 2,150$, $p < .05$). The interaction effect was not significant ($F = .42$, $df = 2,150$, $p < .66$).

The only significant Tukey comparison was between the combined mean for the groups receiving relational questions and the combined mean for the groups that did not receive questions (HSD = .71, $p < .05$).

Table 23

Means and Standard Deviations*

Understanding Relationships Test

	Attribute Prompting Questions	Relational Questions	No Questions	Combined
Advance Organizer	15.00 (3.67)	17.73 (4.26)	13.50 (4.15)	15.41 (4.35)
No Advance Organizer	14.19 (4.16)	14.58 (4.11)	11.27 (4.06)	13.35 (4.16)
Combined	14.60 (3.90)	16.15 (4.44)	12.38 (4.38)	

* n = 26, standard deviations in parentheses

Table 24

Two Way Analysis of Variance

Understanding Relationships Test

Source	df	MS	F
Advance Organizer	1	166.16	10.02*
Within-Text Questions	2	186.54	11.25*
Interaction	2	18.16	1.10
Error	150	16.58	

* $p < .01$

Table 25

Means and Standard Deviations

Concept Taxonomy Test

	Attribute Prompting Questions	Relational Questions	No Questions	Combined
Advance Organizer	4.58 (1.50)	4.89 (1.56)	4.00 (1.64)	4.49 (1.59)
No Advance Organizer	3.27 (1.28)	3.04 (1.56)	2.50 (1.56)	2.94 (1.49)
Combined	3.92 (1.53)	3.96 (1.80)	3.25 (1.76)	

* n = 26, standard deviations in parentheses

Table 26

Two Way Analysis of Variance

Concept Taxonomy Test

Source	df	MS	F
Advance Organizer	1	93.85	40.50*
Within-Text Questions	2	8.32	3.59**
Interaction	2	0.97	0.42
Error	150	2.32	

* $p < .01$

** $p < .05$

Summary of Results

In summary, subjects who received instructional lessons that contained the five single-concept instructional variables performed significantly better on each of the eight assessment measures than the group receiving nonrelated placebo material. A main effect of advance organizer was found on all measures with the exception of the Definition Subtest. A main effect of within-text questions was observed across all of the assessment tests and subtests. A summary of Tukey's pair-wise comparisons among the combined means for the groups receiving attribute prompting questions, relational questions, and no questions is presented in Table 27.

Correlations Among CMT, URT, and CTxT

Table 28 presents the correlations among the Concept Mastery Test, the Understanding Relationships Test, and the Concept Taxonomy Test. The correlations between the CMT and URT was .62. The correlation between the CMT and CTxT was .47. The correlation between the URT and CTxT was .57.

Table 27

Summary of Tukey Pair-Wise Comparisons

	Pair-wise Comparisons of Combined Means		
	Attribute Prompting Questions vs Relational Questions	Attribute Prompting Questions vs No Questions	Relational Questions vs No Questions
Concept Mastery	sig.	sig.	n.s.
- Classificatory	sig.	sig.	n.s.
- Discrimination	sig.	sig.	n.s.
- Labelling	sig.	sig.	n.s.
- Evaluation	n.s	sig.	n.s.
- Definition	sig.	sig.	n.s.
Understanding Relationships	n.s.	sig.	sig.
Concept Taxonomy	n.s.	n.s.	sig.

Table 28

Correlations Among CMT, URT, and CTxT

	CMT	URT	CTxT
CMT	1.00	.62	.47
URT	.62	1.00	.57
CTxT	.47	.57	1.00

CHAPTER V

DISCUSSION

The primary purpose of this study was to determine whether written instructional material that is designed to teach a taxonomy of concepts can be improved through the use of advance organizers and two types of within-text questions. Is the learning of the individual concepts represented in a taxonomy enhanced when the learner is initially presented with an organizational structure of the concepts to be learned? Does answering questions about relationships among the concepts that exist within the taxonomy foster understanding of the relationships? Do questions that focus the learner's attention on the relevant attributes of examples of the concepts effect retention of instructional material?

An additional experimental question posed was whether instructional variables that previous research had shown to facilitate the learning of single concepts would be effective in the instruction of a group of related concepts.

Three instructional lessons were developed to teach a taxonomy

of eight behavior management concepts to the Formal level of attainment. These lessons incorporated the following five single-concept instructional variables that previous research had suggested would promote the attainment of the concepts at the Formal level: concept definition, attribute definition, attribute prompting, rational set, and concept set.

Three advance organizers were constructed that presented written and diagramatic information about the relationships among the concepts that were taught in each of the three instructional lessons.

Two types of within-text questions were developed. Attribute prompting questions were a series of related questions that dealt with the relevant attributes of each concept. These questions were designed to be inserted after each written dramatization (example or nonexample) of a concept. Each question in the series of attribute prompting questions asked whether a relevant attribute of the target concept was present in the dramatization. A final question asked whether the dramatization was an example or nonexample of the concept which the dramatization was illustrating Presented along with attribute prompting questions was a strategy for evaluating whether a dramatization was an example or nonexample. If all of the relevant attributes were present in the dramatization, then the dramatization was an example. If one or more relevant attributes were not present, then the dramatization was a nonexample. Answers and explanations were provided on the page immediately following the questions.

Relational questions were a group of four multiple-choice questions that dealt with the four supraordinate-coordinate-subordinate relationships that exist within any taxonomy of concepts. After a group of three related concepts were taught in the instructional lessons, four relational questions were posed. Each of the relational questions asked about one of the four supraordinate-coordinate subordinate relationships that existed among the three related concepts. An example of a relational question is: Are all positive reinforcement procedures also premack procedures? This question deals with the relationship: Some but not all members of a supra-ordinate class belong to a given subordinate class. Answers in the form of a correct statement of the relationship as well as explanations were provided on the following page. The answer to the above question is: No, only some positive reinforcement procedures are premack procedures. The statements of the relationships among three related concepts were presented in those instructional lessons not containing relational questions.

Advance organizers and within-text questions were presented along with the instructional lessons in accordance with the requirements of a 2 x 3 factorial design. Two levels of the advance organizer factor (present and absent) were crossed with three levels of the within-text questions factor (attribute prompting, relational, and no questions). In addition to the six groups represented in the 2 x 3 design, a seventh group received three instructional

lessons (without organizer and without questions). An eighth group received placebo material.

Two hundred and eight seniors in high school read instructional material or placebo material on three successive days. On the fourth day, three assessment measures were administered. The first measured level of attainment of the eight behavior management concepts. The second measured understanding of the supraordinate-coordinate-subordinate relationships among the concepts in the taxonomy. Recognition of the taxonomic position of each concept was assessed in the third measure.

Discussion of Hypotheses

Hypothesis One. Subjects who received instructional lessons containing single-concept instructional variables performed significantly better on the assessment measures than subjects who received placebo material. Since one group received material totally unrelated to the learning objectives of the study while the other group received a fairly powerful lesson that was designed to teach the objectives, this finding was not unexpected. However, single-concept instructional variables did facilitate the learning of an impressive amount of material in a relatively short period of time. Subjects who read lessons containing single-concept instructional variables mastered over 50 percent of the material on the Concept Mastery Test while subjects who received placebo material answered 30 percent of the questions correctly. One would expect that subjects would correctly answer 20 percent of the questions if they were

responding on a random basis. The ten percentage point discrepancy between the performance of the "placebo" group and what one would expect from chance can be accounted for by prefamiliarization with some of the concepts that were taught (i.e., reinforcement, punisher).

Performance of the "single-concept instructional" group was consistently around the 50 percent level on all of the subtests of the Concept Mastery Test. This finding suggests that the five single-concept instructional variables were not differentially effective in facilitating any one of the cognitive operations that Klausmeier, et al. (1974a) has identified as necessary for the attainment of concepts at the Formal level.

Without the use of an experimental design which would control for the effects of each variable, one cannot specify which of the variables led to the learning of the different objectives of the lessons. However, it seems reasonable to propose that presentation of a definition and relevant attributes to a group of senior high school students is effective in promoting the learning of definitions and the labels of relevant attributes. The use of a rational set and a concept set (divergent examples and convergent examples and nonexamples) along with attribute prompting may have contributed more strongly to the students learning to discriminate relevant attributes, classify examples and nonexamples, and to evaluate examples and nonexamples of the behavior management concepts using relevant attributes as a basis of differentiation. The interaction between these variables which was surely present cannot be determined.

The "single-concept instructional" group derived partial knowledge of the four supraordinate-coordinate-subordinate relationships. As was mentioned, this group did receive a statement of each of the four taxonomic relationships at intermediate points in the lessons. These statements in addition to the five instructional variables enabled subjects to answer 46 percent of the questions on the Understanding Relationships Test. This compared with 26 percent for the "placebo" group. Apparently, a limited amount of direct, expository, instruction was sufficient to communicate, to a limited extent, the nature of the relationships in the taxonomy of concepts.

Interestingly enough, the statement of the relationships came after rather than before the relevant instructional material. Since the statements dealt with information included in the preceding material and were written at a higher, more abstract level, the question of the organizational and subsumptive function of post-passage statements is raised. It remains to be demonstrated, however, whether the post-passage statements of relationships actually increased understanding of the taxonomic relationships, or whether the learning of the relationships occurred as a result of the five single-concept instructional variables.

The "single-concept instructional" group answered on the average one more additional question on the six item Concept Taxonomy Test than did the "placebo" group. Subjects in the former condition were able to use the information contained in the

instructional lesson in recognizing some but certainly not all of the taxonomic positions of each concept. More explicit information dealing with the taxonomy is needed in order for the learner to go beyond the material contained in a lesson designed to teach single concepts, rather than their relationships.

Hypothesis Two. Subjects who received advance organizers preceding instructional lessons performed significantly better on all assessment measures - with the exception of the Definition Subtest - than did subjects who received instructional lessons without advance organizers.

Before discussing the specific findings, it should be indicated that the advance organizers developed for this study were somewhat different in design than the advance organizer as originally conceived of by Ausubel. Since the material to be learned was entirely unfamiliar to the subjects in this study, expository organizers were developed. While these organizers did present information that could have served as "ideational scaffolding" for the learning of new ideas, the information presented was not exclusively at a higher level of generality and abstraction. While the concepts of behavior management procedures, procedures for increasing behavior, and procedures for decreasing behavior were at a higher level of inclusiveness than were the concepts taught in the lessons, the remainder of the concepts presented in the organizers were, in fact, those concepts taught in both the previous days material as well as those concepts that were presented in the lesson immediately following the organizer.

That is, the concepts taught in the first lesson served as subsuming concepts for the concepts taught in the second lesson. The same relationship existed between the concepts presented in third organizer and those taught in the second lesson. It was also felt that presenting in the organizers those concepts that were actually taught in the ensuing lesson would provide the learner with a more clear and stable structure from which to subsume the material to be learned.

A comparison on the Concept Mastery Test of the groups that received advance organizers with the groups that did not reveals over a two and a half point difference between combined group means. The eight concepts taught over the three days were extremely similar. Many shared two or three of a total of four relevant attributes. The organizers apparently enabled the learner to differentiate among the similar behavior management procedures over the three days. It is possible that providing the interrelationships among conceptual categories in advance of learning permitted subjects to sort the diverse and related information about similar phenomena into appropriate categories. The distinctive meanings of the concepts and their criterial attributes was, perhaps, better preserved over time as a result of the organizational knowledge acquired from the organizers. Without having an understanding of the relationships underlying the group of behavior management concepts, subjects who did not receive organizers may have had difficulty in maintaining a distinction among the similar characteristics of the behavior management concepts. This explanation is consistent with Ausubel's theory of meaningful reception learning.

The elevated performance across four of five subtests of the Concept Mastery Test for those groups that received advance organizers suggests that advance organizers may have a more general facilitative effect on learning. Since performance on the Classification Subtest, Discrimination Subtest, Labelling Subtest, and Evaluation Subtest was dependent in large part on recall of important differences among the behavior management procedures, it may have been, as was mentioned, that the advance organizers allowed subjects to maintain distinctions among similar information over a three day period.

While the effect of advance organizers on the Definition Subtest was not statistically significant, the effect did approach significance ($p < .06$). It is unclear why significant effects were found on the other subtests and not on this one. Since the effect was nearly significant, it is felt that little is gained by offering a post-hoc explanation of this finding.

Since the advance organizers provided all the information that was necessary for answering the questions on the Understanding Relationships Test and Concept Taxonomy Test, the finding of a significant main effect is not surprising. What can be said is that subjects who did not receive organizers had difficulty in inferring the nature of the taxonomy of concepts. If an objective of instruction is to teach characteristics of specific taxonomies of concepts (which was not an objective of this study), then the

supraordinate-coordinate-subordinate nature of taxonomic relationships should be explicitly taught. The findings of this study do not indicate if these relationships are better taught in an advance organizer, throughout the instructional lesson, or in post-passage statements.

No conclusions can be drawn as to the relative effectiveness of the individual advance organizers. A more complex design where learning is assessed after each day of instruction would have to be employed. Understanding of the ideas presented in the organizers apart from the material presented in the lesson should be independently determined.

It remains unclear as to which component of the advance organizer was most facilitative. The relative effectiveness of presenting a visual diagram of the taxonomy versus presenting a verbal description of the taxonomic relationships cannot be specified as a result of this study.

Finally, the enduring question of whether an advance organizer effects the initial acquisition of information or whether it permits the learner to retain the information in its' original form (or both) remains, at present, an interesting and unanswerable question.

Hypothesis Three. Subjects who received instructional lessons with attribute prompting questions inserted performed significantly better on the Concept Mastery Test than subjects who received instructional lessons without attribute prompting questions.

Subjects who received attribute prompting questions answered on the average 76 percent of the questions on the CMT. This compares with a 60 percent performance by the combined "relational question" groups and 56 percent for the combined "no questions" groups.

The magnitude of the difference between the "attribute prompting question" groups and the other two groups can be accounted for by at least two non-mutually exlusive explanations. The first is that attribute prompting questions elicited some sort of mathemagenic behavior on the part of the learner. Attribute prompting questions may have permitted the learner to use the information contained in the questions (relevant attributes) in subsequent learning situations. The questions were designed to teach the learner a strategy for associating relevant attributes in a conjunctive fashion. It was hoped that as the learner acquired this strategy, he or she would begin to attend to the relevant attributes of the behavior management procedures upon an initial reading of a written dramatization of a procedure. If this was indeed the case, then subjects may have more efficiently processed information contained in the examples and nonexamples of the different procedures through the adoption of a learning strategy. The learning strategy would constitute a mathemagenic behavior.

An alternate explanation is that attribute prompting questions served as a rehearsal exercise for the learner. The repetition of the relevant attributes after each example and nonexample in the questions gave subjects receiving the questions many more opportunities

to become familiar with and memorize the relevant attributes of the concept. In those instances when subjects were asked to "ask themselves" (without seeing) whether each relevant attribute was present in a written dramatization, subjects had to engage in a memory search for the appropriate attributes. Corrective feedback may have further established the association of relevant attributes with the appropriate concept.

The above alternate explanations are consistent with the forward and backward effect explanations offered to account for the facilitative effects of post-passage questions (e.g. Frase, 1967, 1968a, 1968b; McGraw and Grotelueschen, 1972; Rothkopf and Billington, 1974; Watts and Anderson, 1971). The results of this study lend further support to the generally accepted conclusion of the facilitative effects of post-questioning. Since the study was not designed to test for the presence of forward and backward effects of post-questions, one can only speculate about the cognitive factors underlying the obtained results.

The significant main effect of attribute prompting questions that was found across the five subtests of the Concept Mastery Test suggests that subjects acquired both information and skills as a result of answering attribute prompting questions. It appears that the ability to discriminate and label relevant attributes of the concepts is a necessary condition for performing the other Formal level operations identified in the Model of Conceptual Learning and Development (Klausmeier, et al., 1974a). Knowledge of relevant

attributes apparently enabled subjects to classify examples and nonexamples of the concept, evaluate examples and nonexamples, and to recognize the definition.

An interesting finding was that the combined groups receiving attribute prompting questions performed significantly better on the Understanding Relationships Test than did the groups that did not receive questions. One can infer that subjects acquired a stable understanding of the relevant attributes of the different concepts as a result of receiving attribute prompting questions. If this is the case, then the above finding substantiates the supposition of Klausmeier et al. (1974a, 1974b) that having the labels of the concept and its attributes facilitates understanding of taxonomic relationships.

Hypothesis Four. Subjects who received instructional lessons containing relational questions performed significantly better on the Understanding Relationships Test and Concept Taxonomy Test than subjects who received instructional lessons without relational questions. The relational questions may have had more of a backward than forward effect. The relational questions dealt with relationships among each of three concepts taught in material that immediately preceded their insertion in the instructional lessons. Subjects who read relational questions may have engaged in a conceptualization of the relationships among the set of three concepts. Those subjects who received an advance organizer had already read a statement of the taxonomic relationships before being presented with the relational questions.

For this group of subjects, the questions presumably served as a review in which a consolidation of the previously taught concepts and their relationships could take place. Subjects not receiving an advance organizer may have engaged in a more active process of inferring the relationships among concepts. It is unclear whether this group actually inferred the taxonomic relationships from the preceding instructional material which contained no indication of the nature of the relaionships. For this later group, the page of answers and explanations may have contributed to the greater amount of learning. Undoubtedly, the fact that the relational questions were the same as the ones that appeared in the URT contributed to the elevated performance of the groups that received relational questions.

While it is somewhat uncertain as to whether the performance of the "relational question" groups was due to an effect of pre-familiarization with question format or to a constructive, inferential process, it is clear that statements of the relationships without questions was an inferior instructional technique. Apparently, the "no questions" group did not completely understand or remember all of the statements of the relationships. Answering questions is a more active process in comparison to simply reading a parallel statement containing no questions. The higher performance of the "relational question" groups on the Concept Taxonomy Test in comparision to the "no question" groups lends weight to the assertion that relational questions elicited some kind of

cognitive structuring of the related concepts. The questions contained in the CTxT were different in substance and form from the relational questions.

Hypothesis Five. Performance on the Understanding Relationships Test and Concept Taxonomy Test was positively correlated with performance on the Concept Mastery Test. The correlations of .62 and .47 are high considering the differential effects of treatments on the level of mastery of the concepts. That is, you would expect that subjects who received advance organizers would perform better on the URT and CTxT since the organizers included a fairly detailed description of the taxonomic relationships. The effect of presenting advance organizers on performance on the URT and CTxT may have outweighed the effect due to level of attainment of the concepts on the CMT. Said in a slightly different manner, subjects in the groups receiving advance organizers may have memorized the taxonomic relationships irregardless of their level of mastery of the concepts.

The high correlations replicate the findings of a number of studies (e.g., Bernard, 1973; Klausmeier et al., 1974a, 1974b, 1974c) which found that the level at which concepts are attained is positively correlated with the understanding of taxonomic relationships. Klausmeier et al., (1974a) has written that as a concept becomes attained at successively higher levels, it can be more readily used as a basis for cognizing supraordionate-coordinate-subordinate relationships.

While the objective of this study was to teach a group of concepts at the Formal level rather than to facilitate the learning of taxonomic relationships, a significant amount of learning did occur in this later area. A possible explanation of the transfer of learning of the concepts to the understanding of the relationships among the concepts is that the instructional variables employed in the lessons facilitated cognitive operations that underly the learning of taxonomic relationships.

It is proposed that an important cognitive operation underlying the learning of taxonomic relationship is the utilization of single attributes and combinations of attributes in conceptualizing coordinate and supraordinate-subordinate relationships among classes of concepts. Subjects who participated in this study were developmentally able to understand and peform the variety of classification skills that are necessary for the understanding of taxonomic relationships. That is, 16, 17, and 18 year olds have the cognitive and linguistic capacity to use terms such as "some" or "all" to describe and understand inclusive relationships among concepts. When asked to classify groups of familiar concepts, they have relatively few problems in joining subclasses to form a supraordinate class and in dividing supraordinate classes into constituent subordinate classes. The extent to which subjects understood taxonomic relationships among the group of behavior management concepts may have depended, then, on their ability to to recognize the distinctive attributes of each concept.

Educational Implications

The value of an advance organizer as a pedogogical aid received substantial support in this study. It would appear that the learning of a group of concepts related in a taxonomic fashion is enhanced if the learner is initially provided with a description of the relationships among the classes of concepts. The nature of the description (written, pictorial) will depend on the developmental status of the learner as well on the nature of the taxonomy.

The advance organizers employed in this study presented inclusive concepts that could subsume the concepts that were taught in the instructional lessons. In addition, the organizers contained the specific concepts that were taught in the lesson. It is this author's feeling that if the subsuming concepts that are presented in the organizer are meaningful to the learner, inclusion of the target teaching concepts within the organizer will facilitate the learning of the concepts. If the learner does not "see" or cannot infer the relationship of the ideas presented in the organizer with those that are to be taught, the value of the organizer remains uncertain. Being explicit as to the relationship between the ideas presented in the organizer and the ideas introduced in new material makes more certain that the learner will have a conceptual framework that can be used as a basis for meaningful learning.

Questions have been used in textbooks for years. Results from this and other studies suggest that certain types of questions

elicit attentional and rehearsal processes that contribute to effective learning.

The questions employed in this study derived closely from the nature of the instructional material. An important condition for performing cognitive operations at the Formal level of attainment is knowledge of the relevant attributes of concepts. Extensive use of questions that focused the learner's attention on the relevant attributes of the concepts taught in the lessons yielded impressive performance on tests designed to measure concept mastery and understanding of taxonomic relationships. Questions that deal with the relationships among concepts may provide the learner with an opportunity for consolidation of learning. While the two types of questions used in this study were effective in facilitating certain behaviors, it should be clear that this not be the case for all types of within-text questions. Recent research (e.g., Hiller, 1974; Rickards & DiVesta 1974) has shown that certain types of within-text questions actually depress performance.

The use of concept definitions, attribute definitions, attribute prompting, rational sets, and concept sets is a reasonable approach in arranging instruction designed to teach concepts at higher levels of attainment. These variables appear to provide a solid basis from which the attainment of concepts can be achieved. However, additional instructional adjuncts appear necessary if a high degree of mastery of the concept material is desired.

Finally, it should not be inferred by any stretch of the imagination that the instructional procedures employed in this study are optimum for teaching behavior management concepts in the classrooms of our schools. The focus of this study was on the identification and development of effective written instructional material. Thus, the findings of this study relate more to the development of materials rather than to ongoing teacher-student behaviors which account for a large portion of classroom instruction. The interactive nature of much classroom learning where students are involved with other students, teachers, and instructional materials, is considered by this author to be of critical importance in the determination of outcomes of learning.

Finally, the results of this study indicate that a great deal has been learned over the past ten years about the design of instructional materials. Whereas in this study only 30 percent of control subjects mastered learning material, subjects in the least powerful experimental group that received instruction that incorporated procedures that previous educational research had shown to be effective demonstrated over 50 percent mastery. Subjects who received in addition to basic instructional procedures two instructional adjuncts (advance organizers and within-text questions) mastered over 70 percent of the learning material. While much has been said to denigrate the contributions of educational research to educational programming and instructional material development, the findings of this study clearly point to the valuable contributions that educational psychologists have and can make in providing a more satisfactory and effective learning environment.

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APPENDIX A

Partial Concept Analyses of Behavior Management Concepts*

* Matched examples and nonexamples included in the three lessons (see Appendix B)

Partial Concept Analysis of Positive Reinforcement Procedures

Defintiion A person is given a reinforcer immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

Relevant Attributes:

1. The procedure is used to increase the number of times a behavior occurs.
2. A person is given a reinforcer.
3. A reinforcer is given immediately after the person's behavior occurs.
4. A reinforcer is given every time the person's behavior occurs.

Irrelevant Attributes:

1. Kind of reinforcer given.
2. Characteristics of person giving reinforcer.
3. Characteristics of person whose behavior increases.
4. Kind of behavior that increases.

Partial Concept Analysis of Primary Reinforcement Procedures

Definition: A person is given favorite food or social reinforcers immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

Relevant Attributes:

1. The procedure is used to increase the number of times a person's behavior occurs.
2. A person is given a favorite food or social reinforcers.
3. Favorite food or social reinforcers are given immediately after the person's behavior occurs.
4. Favorite food or social reinforcers are given every time the person's behavior occurs.

Irrelevant Attributes:

1. Kind of food or social reinforcer given.
2. Characteristics of person given favorite food or social reinforcer.
3. Characteristics of person whose behavior increases.
4. Kind of behavior that increases.

Partial Concept Analysis of Premack Procedures

Definition: A person is permitted to participate in an activity the person really likes immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times the person's behavior occurs.

Relevant Attributes:

1. The procedure is used to increase the number of times a behavior occurs.
2. A person is permitted to participate in an activity the person really likes.
3. Permission is given immediately after the person's behavior occurs.
4. Permission is given every time the person's behavior occurs.

Irrelevant Attributes:

1. Kind of activity the person is permitted to engage in.
2. Characteristics of person giving permission.
3. Characterics of person whose behavior increases.
4. Kind of behavior that increases.

Partial Concept Analysis of Negative Reinforcement Procedures

Definition: A negative is removed immediately after and every time a person's behavior occurs. This procedure results in an increase in the number of times a person's behavior occurs.

Relevant Attributes:

1. The procedure results in an increase in the number of times a person's behavior occurs.
2. A negative is removed.
3. A negative is removed immediately after the person's behavior occurs.
4. A negative is removed every time the person's behavior occurs.

Irrelevant Attributes:

1. Kind of negative removed.
2. Characteristics of person removing negative.
3. Characteristics of person whose behavior increases.
4. Kind of behavior that increases..

Partial Concept Analysis of Punishment Procedures

Definition: A person is given a punisher immediately after and every time the person's behavior occurs. This procedure is used to decrease the number of times a person's behavior occurs.

Relevant Attributes:

1. The procedure is used to decrease the number of times a person's behavior occurs.
2. A punisher is given.
3. A punisher is given immediately after and every time the person's behavior occurs.
4. A punisher is given every time the person's behavior occurs.

Irrelevant Attributes:

1. Kind of punisher given.
2. Characteristics of person giving punisher.
3. Characteristics of person whose behavior decreases.
4. Kind of behavior that decreases.

Partial Concept Analysis of Withdrawal of Reinforcer Procedures

Definition: A reinforcer is taken away immediately following every occurrence of a person's behavior. This procedure is used to decrease the number of times a behavior occurs.

Relevant Attributes:

1. The procedure is used to decrease the number of times a person's behavior occurs.
2. A reinforcer is taken away.
3. A reinforcer is taken away immediately after the person's behavior occurs.
4. A reinforcer is taken away every time the person's behavior occurs.

Irrelevant Attributes:

1. Kind of reinforcer that is taken away.
2. Characteristics of person who takes the reinforcer away.
3. Characteristics of person whose behavior decreases.
4. Kind of behavior that decreases.

Partical Concept Analysis of Extinction Procedures

Definition: A reinforcer that used to be given following a person's behavior is taken away. The reinforcer is taken away immediately following every time the person's behavior increases. This procedure issued to decrease the number of times a person's behavior occurs.

Relevant Attributes:

1. The procedure is used to decrease a behavior.
2. A reinforcer that used to be given following a behavior is taken away.
3. A reinforcer is taken away immediately following the person's behavior.
4. A reinforcer is taken away each time the behavior occurs.

Irrelevant Attributes:

1. Kind of reinforcer that used to be given.
2. Characteristics of person who takes the reinforcer away.
3. Characteristics of person whose behavior decreases.
4. Kind of behavior that decreases.

Partial Concept Analysis of Response Cost Procedures

Definition: A person is fined immediately following each time the person's behavior occurs. This procedure results in a decrease in the number of times a person's behavior occurs.

Relevant Attributes:

1. The procedure is used to decrease a person's behavior.
2. A person has to pay a fine.
3. A person is fined immediately after the person's behavior occurs.
4. A person is fined each time the person's behavior occurs.

Irrelevant Attributes:

1. Kind of fine the person pays.
2. Characteristics of person who administers fine.
3. Characteristics of person whose behavior decreases.
4. Kind of behavior that decreases.

APPENDIX B

Instructional Lessons*

*Lesson One contains single-concept instructional variables.

Lesson Two contains single-concept instructional variables and attribute-prompting questions.

Lesson Three contains single-concept instructional variables and relational questions

LESSON ONE

Name _____

Date _____

Class _____

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In this lesson you will learn about two procedures that can be used to increase the number of times a person's behavior occurs. First, there are a couple of terms that you should become familiar with.

The first term is important property. All object, events and just about anything you can think of have important properties. Important properties are characteristics of things that define what they are. The important properties of 'chair' are (1) it has a back, (2) it is a single-person seat, and (3) it has a rigid seat. All chairs have these three important properties. If an object has a back, a single-person seat and a rigid seat it is an example of a chair.

Anything that has the three important properties of chair is called an example of chair. Examples have all the important properties of the thing you are talking about. "Triangles" have five important properties. All triangles (1) have three straight sides, (2) have three angles, (3) are plane figures, (4) are closed figures, and (5) are simple figures. Any geometric form that has all of these five important properties is an example of triangle.

A non-example lacks one or more important properties. A "stool" is a non-example of "chair" because it does not have a back. A "square" is a non-example of "triangle" because it lacks the two important properties of having three sides and having three angles.

Another term that will be used in this lesson is reinforcer. A reinforcer is any object or event that a particular person likes such as a hug, money, praise, food, etc. It is any object or event that a person will work for. Examples of a reinforcer will be presented in this lesson.

The two procedures that can be used to increase the number of times a person's behavior occurs are called *positive reinforcement procedures* and *primary reinforcement procedures*. A definition as well as the important properties of each procedure will be presented. Examples and non-examples of each procedure will help show how each procedure is used.

A definition of *positive reinforcement procedures* is provided in the box below:

> *Positive reinforcement procedures:* A person is given a reinforcer immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

Positive reionforcement procedures have four important properties.

1. The procedure is used to increase the number of times a behavior occurs.

There are many times we want someone to do something for us. You may want a friend to lend her car to you. You may want your teacher to get off your back and be a little more friendly. *Positive reinforcement procedures* can be used to increase the number of times each of these behaviors occur.

2. A person is given a reinforcer.

   As was mentioned earlier, a reinforcer is something that a person likes. It is something that a person will work for. Suppose that you know that a certain teacher likes to be told that she is doing a good job, is explaining things clearly, etc. By telling a teacher these things, you are giving her a reinforcer. A reinforcer for the friend whose car you want to borrow might be letting the friend use something that you have. If you have an electronic calculator that you know your friend likes to use, letting your friend use the electronic calculator would be a reinforcer.

3. A reinforcer is given immediately after the person's behavior occurs.

   If you wanted a friend to lend you a car, you would give the person a reinforcer (use of the calculator) immediately after the person lends you the car. If you wanted a teacher to be more friendly, you would give the teacher a reinforcer (telling her she's doing a good job) immediately after the teacher does something friendly. A person is given a reinforcer immediately after a behavior occurs; not at the end of the day or week.

4. A reinforcer is given every time the person's behavior occurs.

   To get the friend to lend you a car more often, you must lend the person your calculator everytime you are permitted to borrow the car. The teacher must be told each time that she is doing a good job, or explaining things clearly if you want her to increase the number of times she is friendly.

Now you will be presented with an example and a non-example of a *positive reinforcement procedure*. The example will have all four important properties. The non-example will lack one or more of the important properties.

a. this is an example

Jack liked to drive around town but didn't own a car. His folks would rarely lend him theirs. His friend Marge would sometimes let him borrow hers. To get Marge to lend him her car more often, he suggested the following. He knew that Marge enjoyed playing music on his stereo. He told her that every time he borrowed her car she could come right over and play whatever music she wanted. The number of times Marge lent Jack her car increased over the following months.

b. this is a non-example

Claire loved to drive around town after dinner, but unfortunately, she didn't own a car. Her friend Bill would sometimes lend her his. To get Bill to lend her his car more often, she told him that everytime she borrowed his car, he could come over sometime when she was free and use her stereo. Even though Bill really liked playing music on Claire's stereo, he did not increase the number of times he lent Claire his car.

"a" is an example because it contains all four important properties. The procedure is used to increase a behavior (Marge lending Jack her car). A person (Marge) is given a reinforcer (use of Jack's stereo). The reinforcer is given to Marge immediately after every time she lends Jack her car.

"b" is an non-example because it lacks one important property. The reinforcer (letting Bill use stereo) is not given to Claire immediately after Bill lends his car. It is given "sometime when she was free." For *positive reinforcement procedures* to work, the reinforcer must be given immediately after the behavior occurs.

a. There is a tenth-grade student, Becky, in Mr. Howard's history class who consistently turned in sloppy test papers. Mr. Howard told Becky that each time she wrote a neat test paper, she could earn an extra five points on the exam which was corrected at the end of class. Since earning a good grade was important to Becky, she began to write more neatly.

this is an example

b. There is a student in Ms. Sands' tenth-grade English class who had very sloppy writing. Ms. Sands felt that his sloppy writing would hurt him in other classes and in years ahead and decided something had to be done. Ms. Sands told him that each time he wrote a neat test paper, he could earn an extra five points. The student found that sometimes Ms. Sands would give him free points when he wrote neatly and sometimes she wouldn't. As a result, the student continued to write sloppy papers.

this is a non-example

"a" is an example because the procedure contains all four important properties of *positive reinforcement procedures*. The procedure is used to increase the number of times a behavior occurs (writing neatly). Becky is given a reinforcer (five extra exam points) each time she writes a neat paper. Becky is given the points immediately after (at the end of class) she writes neatly.

"b" is a non-example because Ms. Sands did not give the student extra points each time he wrote neatly. To be a *positive reinforcement procedure*, the extra points had to be given each time the student wrote neatly.

Positive reinforcement procedures: A person is given a reinforcer immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

a. John, Dick and Sue complained that their sociology teacher, Mr. Clemens, was vague and uninteresting. Apparently, the examples that he gave in class were not related to things that his students had experienced. The three students knew that Mr. Clemons liked being told he was teaching well. The students were able to increase the number of interesting examples Mr. Clemons gave by complimenting him immediately after each time he gave good examples.

this is an example

b. Ms. Harris, Connie and Jeff's psychology teacher, had difficulty in presenting examples of material that Connie and Jeff could relate to. They decided to tell Ms. Harris how much they enjoyed a class immediately after and each time she gave good examples. Since Ms. Harris really didn't appreciate when students talked to her about her teaching (even if they were saying nice things), she didn't start to give any more interesting examples.

this is a non-example

"a" is an example because all four important properties are present. The reinforcer (complimenting Mr. Clemens) is given to Mr. Clemens immediately after each time he gave good examples.

"b" is a non-example because no reinforcer is present. Remember, a reinforcer is something that a person must like to receive. Telling Ms. Harris that she gives good examples is not a reinforcer since she "didn't appreciate it when students talked to her about her teaching."

this is an example

a. Jill's mother wanted her to increase the number of times she helped her younger brother with his homework. Jill told her mother she would help him more often if each time she helped she could watch whatever television program she wanted immediately after. Jill was not generally permitted to watch television on weekdays. Her mother agreed and Jill began to help her brother more often.

this is a non-example

b. Bob's mother wanted him to increase the number of times he helped his younger sister with her homework. Bob told his mother that he would help his sister more often if each time he helped, she would take away his responsibility of having to do dinner dishes. His mother agreed and Bob began to help his sister more often.

"a" is an example because it contains all four important properties. A reinforcer (watching television) is given to Jill each time and immediately after a behavior occurs (helping brother with homework).

"b" is a tricky one. No reinforcer is being given. Something is being taken away (not having to do dishes). This is a different kind of procedure which is used to increase a behavior. You will learn more about this procedure later on.

A subset of *positive reinforcement procedures* is *primary reinforcement procedures*. *Primary reinforcement procedures* are also used to increase the number of times a person's behavior occurs. The main difference between these two procedures is that while *positive reinforcement procedures* involve giving any kind of reinforcer after a behavior occurs, *primary reinforcement procedures* involve giving a person either a favorite food or social reinforcers.

Favorite food is something that can be eaten or drunk such as candy, ice cream, pie, soda, or beer.

Social reinforcers are a subset of reinforcers. That is, some kinds of reinforcers are social reinforcers, while some are not social reinforcers. Social reinforcers include such things as words of praise ("Good," "That is interesting," "That shows a great deal of work"), facial expressions (smiling, nodding head up and down), and physical contact (hugging, touching, patting head, shoulder or back). For something to be a social reinforcer, it must be liked by the person who receives it.

Here is its definition:

> *Primary reinforcement procedures:* A person is given favorite food or social reinforcers immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

Important properties of *primary reinforcement procedures* are:

1. the procedure is used to increase the number of times a person's behavior occurs
2. a person is given a favorite food or social reinforcers
3. favorite food or social reinforcers are given immediately after the person's behavior occurs
4. favorite food or social reinforcers are given every time the person's behavior occurs

a. this is an example

Winston was little bit lazy. One thing he always had his mother do for him was tie his shoes in the morning. His mother felt that Winston was old enough to tie his own shoes. To get him to do so, she told Winston that every time he finished tying both his shoes in the morning, she would give him a couple of his favorite cookies. She found that from then on, Winston would almost always tie his own shoes.

b. this is a non-example

Danny knew how to tie his own shoes but really didn't like to. His father told Danny that every time he tied his shoes, he could buy his favorite ice cream when his father returned home from work at night. Danny, however, still didn't tie his shoes.

"a" contains all four important properties. Winston's mother found she could increase the number of times Winston tied his shoes by giving him his favorite cookies immediately after and each time he tied his shoes.

"b" is not an example of *primary reinforcement procedures* because Danny was not given his favorite ice cream immediately after he tied his shoes. To be an example, the ice cream should have been given immediately after Danny tied his shoes and not "when his father returned from work at night."

Here again is the definition of *primary reinforcement procedures:*

Primary reinforcement procedures: A person is given favorite food or social reinforcers immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

a. this is an example

Julie's third grade teacher, Ms. Winthrop noticed that Julie liked to be told that she was doing a good job. Ms. Winthrop told Julie one day that from now on she wanted Julie to have a neat and clean desk. Every time she saw Julie cleaning her desk, she would walk up to Julie and say "Looks good", or "Keep up the good work." Julie's desk soon became much neater than it had previously.

b. this is a non-example

Christine almost always had trouble finding her class assignment because her desk was such a mess. Mr. Fuller knew Christine liked being praised by him whenever she completed something. During the next month, Christine had her desk neat on five separate occasions. Mr. Fuller told her what a nice job she had done on two of those occasions. Christine did not, however, clean her desk any more often during the last part of the year than in the beginning.

Once again, all four important properties are contained in "a". A social reinforcer is given (being told she was doing a good job) to increase the number of times Julie cleans her desk. Notice that it is important that Julie likes being told that she was doing a nice job. If she hadn't, the procedure wouldn't work.

"b" is a non-example because Mr. Fuller did not tell Christine what a nice job she was doing each time she cleaned her desk.

a. Mr. Eckstein worked during the day and was always rushed to get dinner on the table by six o'clock. Sometimes he would need something from the corner store and would ask his six year old daughter to run down and get whatever he needed. He found that his daughter would be much more likely to run an errand for him if he gave her a hug and a kiss when she returned.

this is an example

b. Mr. Sands usually forgot something he needed when shopping at the grocery store. Whenever he asked his daughter to please go to the store and pick up something, she usually refused and made excuses why she couldn't go. One day, Mr. Sand's said: "If you go to the store for me, when you return you can play anything you want on the stereo." His daughter loved to play tunes although she usually wasn't allowed to. From then on, she would always go to the store for her father. Her father always made sure he kept his part of the agreement.

this is a non-example

In the example "a", a hug and kiss was used effectively to get Mr. Eckstein's daughter to go to the corner store. For most children, kisses and hugs can be used effectively. Some children, however, do not like to be hugged and kissed. With these children, you would not be able to use hugs or kisses to get them to do anything.

In the non-example "b", While a reinforcer is presented every time Mr. Sand's daughter went to the store, it wasn't food or social reinforcers. This is an example of another procedure that will be discussed tomorrow. Remember, food or social reinforcers are the only things that can be presented using this procedure.

Please reread the definition again.

Primary reinforcement procedures: **A person is given favorite food or social reinforcers immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.**

a. Aunt Ruth had recently moved into town to be closer to her brother's family. She wanted her niece and nephew to visit her often. For the first six months she had been there, she received only occasional visits, not as many as she would have liked. Figuring that stronger measures were necessary on her part, she decided to bake her niece and nephew's favorite pie each time they visited. As you might guess, the number times she received visits increased dramatically over the following year.

this is an example

b. Grandma Johnson complained to her daughter that it would be nice if her grandson visited her more often. Her daughter suggested that if she baked cookies each time they visited he would likely pay her more visits.isits. While Grandma did this each time her grandson came over, he still did not come over as often as Grandma would have liked. Since the grandson didn't really like his Grandma's cookies, he still did not come over as often as Grandma would have liked.

this is a non-example

It should be assumed in example "a" that Aunt Ruth offered her niece and nephew their favorite pie soon after they arrived. (Food was given soon after the visiting behavior occurred).

The only thing that makes "b" a non-example is that for this particular grandson, Grandma's cookies are not a favorite food. Food only works to increase the number of times a behavior occurs if the person happens to like the food.

If you finish early, please look over parts of the lesson that were unclear and note them.

If you finish early, please look over parts of the lesson and make sure you understand the material that was presented.

Lesson 2

Name_____

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Yesterday, you learned about *positive reinforcement procedures*.

> Definition: A person is given a reinforcer immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

You also were presented with material dealing with *primary reinforcement procedures*.

> Definition: A person is given favorite food or social reinforcers immediately after and every time the persons's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

Today, you will learn about several new procedures. The first one is called *premack procedures*. The procedure was created by a psychologist whose name was Premack. A definition of this procedure is provided in the box below:

> *Premack procedures:* A person is permitted to participate in an activity the person really likes immediately after every time the person's behavior occurs. This procedure is used to increase the number of times the person's behavior occurs.

The important properties of *premack procedures* are:

1. The procedure is used to <u>increase</u> the number of times a behavior occurs.
2. A person is permitted to participate in an activity the person really likes.
3. Permission is given immediately after the persons's behavior occurs.
4. Permission is given every time the person's behavior occurs.

As you did yesterday, you will be presented with an example and a non-example of *premack procedures*. By answering questions, you will be able to tell if it is or is not an example of the procedure. Remember, if all four of the important properties of the procedure are present (if you answer yes to each question), then the procedure is an example.

a. Wendy was angry at her sister, Susan, because Susan generally refused to lend Wendy her new hair dryer. One day Wendy told Susan that every time Susan lent her the hairdryer, she would let Susan play any of her new records immediately after. Wendy had several of Susan's favorite records. Since Susan rarely got a chance to play Wendy's records, she began to increase the number of times she lent Wendy her hairdryer.

1. Is the procedure used to increase the number of times a behavior occurs? YES NO
2. Is a person permitted to participate in an activity the person really likes? YES NO
3. Is permission given immediately after the person's behavior occurs? YES NO
4. Is permission given every time the person's behavior occurs? YES NO

Is this an example of a premack procedure? YES NO

b. Steve refused to let his younger brother Bill use his new electric shaver. Bill suggested to Steve that each time he lent him his shaver, he could play whichever of his records he wanted. Since Steve really didn't like Bill's taste in music (i.e., he didn't like his records) he did not increase the number of times he lent Bill his shaver.

1. Is the procedure used to increase the number of times a behavior occurs? YES NO
2. Is a person permitted to participate in an activity the person really likes? YES NO
3. Is permission given immediately after the person's behavior occurs? YES NO
4. Is permission given every time the person's behavior occurs? YES NO

Is this an example of a premack procedure? YES NO

a.

1. Is the procedure used to increase the number of times a behavior occurs? (YES) NO (lending hairdryer)
2. Is a person permitted to participate in an activity the person really likes? (YES) NO (playing records)
3. Is permission given immediately after the person's behavior occurs? (YES) NO
4. Is permission given every time the person's behavior occurs? (YES) NO

Is this an example of a premack procedure? (YES) NO

Wendy was able to get her sister, Susan, to lend her the hairdryer more often. She did this by permitting Susan to play her records immediately after every time Susan let her use the dryer.

b.

1. Is the procedure used to increase the number of times a behavior occurs? (YES) NO (using electric shaver)
2. Is a person permitted to participate in an activity the person really likes? YES (NO)
3. Is permission given immediately after the person's behavior occurs? (YES) NO
4. Is permission given every time the person's behavior occurs? (YES) NO

Is this an example of a premack procedure? YES (NO)

The problem here is that Steve didn't like his brother's records. To be an example, Steve has to be permitted to do something he likes.

a. Jill's father wanted Jill to do more of the house chores. Jill arranged with her father to do more of the chores if he would take her to the park or beach immediately after. During the following months, Jill's father would not always have the time or desire to take Jill where she wanted. Because of this, Jill did not increase the number of chores she did

1. Is the procedure used to increase the number of times a behavior occurs? YES NO
2. Is a person permitted to participate in an activity the person really likes? YES NO
3. Is permission given immediately after the person's behavior occurs? YES NO
4. Is permission given every time the person's behavior occurs? YES NO

Is this an example of a premack procedure? YES NO

b. Chuck's mother was always hassling Chuck about mowing the lawn. To get his mother off his back, he decided to make the following deal. He told his mother that he would mow the lawn if he could go to the pool hall immediately after. Chuck was only allowed to play pool on certain occasions. His mother agreed and permitted Chuck to go each time he cut the lawn. Chuck soon began to increase the number of times he cut the lawn.

1. Is the procedure used to increase the number of times a behavior occurs? YES NO
2. Is a person permitted to participate in an activity the person really likes? YES NO
3. Is permission given immediately after the person's behavior occurs? YES NO
4. Is permission given every time the person's behavior occurs? YES NO

Is this an example of a premack procedure? YES NO

a.

1. Is the procedure used to increase the number of times a behavior occurs? (YES) NO (do more chores)
2. Is a person permitted to participate in an activity the person really likes? (YES) NO (go to park or beach)
3. Is permission given immediately after the person's behavior occurs? (YES) NO
4. Is permission given every time the person's behavior occurs? YES (NO) Is this an example of a premack procedure? YES (NO)

In this non-example, the father failed to take his daughter each time she helped him with the chores. It would be an example if the father took his daughter each time.

b.

1. Is the procedure used to increase the number of times a behavior occurs? (YES) NO (cutting lawn)
2. Is a person permitted to participate in an activity the person really likes? (YES) NO (playing pool)
3. Is permission given immediately after the person's behavior occurs? (YES) NO
4. Is permission given every time the person's behavior occurs? (YES) NO Is this an example of a premack procedure? (YES) NO

All four important properties are present.

Again, here is the definition of *premack procedures:*

> *Premack procedures:* A person is permitted to participate in an activity the person really likes immediately after every time the person's behavior occurs. This procedure is used to increase the number of times the person's behavior occurs.

Try to decide if the following procedures are examples or non-examples of *premack procedures* by asking yourself whether each of the four important properties are present. If you answer YES to each question then the procedure is an example. If you answer NO to one or more questions, then the procedure is a non-example. No peeking at the answers, pl...

a. Tim was putting together a "do-it-yourself" transistor television. To speed things up, he asked his friend Richard to help him. At first Richard would help only occasionally. One day, Tim told Richard "Every time you help me, immediately after, I will give you 10 marbles. When you have accumulated 100 marbles I will give you my fishing rod that you like so much." Richard was always borrowing Tim's rod and so began to help Time more often.

Is this an example of a premack procedure? YES NO

b. Julie would have liked her friend Diana to help her more of the time in putting together a short-wave radio. Julie knew that Diana liked to use Julie's electric drill and power saw although she was rarely permitted to use them. So Julie made the following agreement with Diana. Immediately after each time Diana helped her with her radio, she would let Diana use her drill and saw. Diana began helping Julie often so she could have the chance to use her tools.

Is this an example of a premack procedure? YES NO

a.

1. Is the procedure used to increase the number of times a behavior occurs? (YES) NO (helping friend)
2. Is a person permitted to participate in an activity the person really likes? YES (NO)
3. Is permission given immediately after the person's behavior occurs? YES (NO)
4. Is permission given every time the person's behavior occurs? YES (NO)

Is this an example of a premack procedure? YES (NO)

Richard is not permitted to participate in an activity. He is given 10 marbles (reinforcers) each time he helped Tim. When he collected 100 marbles he was to be given Tim's fishing rod.

b.

1. Is the procedure used to increase the number of times a behavior occurs? (YES) NO (helping friend)
2. Is a person permitted to participate in an activity the person really likes? (YES) NO (using tools)
3. Is permission given immediately after the person's behavior occurs? (YES) NO
4. Is permission given every time the person's behavior occurs? (YES) NO

Is this an example of a premack procedure? (YES) NO

All four important properties are present.

Over the past two days, you have learned about *positive reinforcement procedures*, *primary reinforcement procedures*, and *premack procedures*. There are certain relationships that exist among these somewhat similar procedures. The statements below are different ways of looking at the relationships. Make sure you read each statement carefully.

1. Positive reinforcement procedures are either primary reinforcement procedures or premack procedures.

   That is, positive reinforcement procedures are made up of two subsets: primary reinforcement procedures and premack procedures.

2. Only some positive reinforcement procedures are premack procedures.

   The more general positive reinforcement procedure is also made up of primary reinforcement procedures.

3. All primary reinforcement procedures are also positive reinforcement procedures.

4. No primary reinforcement procedures are premack procedures.

   They are two different procedures.

Negative reinforcement procedures are used to increase the number of times a person's behavior occurs.

The definition of *negative reinforcement procedures* is:

> *Negative reinforcement procedures:* A negative is removed immediately after and every time a person's behavior occurs. This procedure results in an increase in the number of times a person's behavior occurs.

A negative is any object or event that a person doesn't like. A negative is anything that a person will work actively to avoid such as getting yelled at, being hit, doing homework, and cleaning one's room.

The important properties are:

1. The procedure results in an increase in the number of times a person's behavior occurs.
2. A negative is removed.
3. A negative is removed immediately after the person's behavior occurs.
4. A negative is removed every time the person's behavior occurs.

The idea behind this procedure is that by behaving in a certain way we can avoid something negative. By closing a window, we can avoid being cold. By picking a baby up, we can stop it from crying. By taking off our shoes when they pinch, we can avoid pain.

One thing to keep in mind is that *negative reinforcement procedures* are used to <u>increase</u> a behavior. The procedure is called negative reinforcement because a negative is taken away after a behavior occurs. Both *positive reinforcement procedures* and *negative reinforcement procedures* are used to <u>increase</u> the number of times a behavior occurs.

a. Rick's teacher, Ms. King, seemed to always pick on Rick for things he was doing or she imagined he was doing. Rick found that each time he left Ms. King's class to get a drink of water he could avoid being yelled at. During the school year, Rick increased the number of trips he made to the fountain.

1.	Does the procedure result in an increase in the number of times a person's behavior occurs?	YES	NO
2.	Is a negative removed?	YES	NO
3.	Is a negative removed immediately after a behavior occurs?	YES	NO
4.	Is a negative removed everytime the behavior occurs?	YES	NO

Is this an example of a negative reinforcement procedure? YES NO

b. Wilma's teacher, Mr. Merlo, rarely had anything nice to say to Wilma. The school's guidance counselor told Wilma that she could probably make Mr. Merlo more friendly by asking questions in class that showed she was interested in what he was teaching. Doubtful, Wilma tried this approach and to her surprise found that Mr. Merlo became increasingly more friendly.

1.	Does the procedure result in an increase in the number of times a person's behavior occurs?	YES	NO
2.	Is a negative removed?	YES	NO
3.	Is a negative removed immediately after a behavior occurs?	YES	NO
4.	Is a negative removed everytime the behavior occurs?	YES	NO

Is this an example of a negative reinforcement procedure? YES NO

a.

1. Does the procedure result in an increase in the number of times a person's behavior occurs? (YES) NO (leaving class)
2. Is a negative removed? (YES) NO (teacher yelling)
3. Is a negative removed immediately after a behavior occurs? (YES) NO
4. Is a negative removed everytime the behavior occurs? (YES) NO

Is this an example of a negative reinforcement procedure? (YES) NO

In this example, a negative is removed (teacher yelling) immediately after a behavior occurs (Rick getting a drink). Every time Rick left the room he was able to escape from the complaints of his teacher.

b.

1. Does the procedure result in an increase in the number of times a person's behavior occurs? (YES) NO (teacher being friendly)
2. Is a negative removed? YES (NO)
3. Is a negative removed immediately after a behavior occurs? YES (NO)
4. Is a negative removed everytime the behavior occurs? YES (NO)

Is this an example of a negative reinforcement procedure? YES (NO)

While this procedure has been used often by students to change the behavior of a teacher, it is not a *negative reinforcement procedure*. No negative is being removed following Wilma's behavior (asking questions).

(Remember, if you answer YES to each question. The procedure contains all important properties and is an example.)

a. The Morrison's were a very well organized family. Every member knew exactly what things they were responsible for doing and did them. All except Karen. Karen refused doing her chores on the grounds that she had far too many other more important things to do. One day Karen's mother told her that at the beginning of each week she could pick out three chores to do and wouldn't have to do any more. Karen's parents tried this approach for three weeks and at the end of that time found that it didn't work. Karen still refused to do any work.

1.	Does the procedure result in an increase in the number of times a person's behavior occurs?	YES	NO
2.	Is a negative removed?	YES	NO
3.	Is a negative removed immediately after a behavior occurs?	YES	NO
4.	Is a negative removed everytime the behavior occurs?	YES	NO

Is this an example of a negative reinforcement procedure? YES NO

b. Each person in the Richard's family had eight chores they were responsible for doing every week. Everyone did them except for Tim who generally refused to do any of them. Tim's mother and father tried talking to Tim and even took away special priviledges but nothing seemed to work. One week, Tim had managed to complete three chores. His father said: "From now on, if you do any three chores, you don't have to do any more." Relieved that he didn't have to do what he considered an impossible number of chores, Tim started to do three chores every week. Over the next weeks, Tim's father was able to increase the number of chores Tim did from taree to seven by increasing the number of chores Tim was expected to do before excusing him from doing the rest.

1.	Does the procedure result in an increase in the numbe of times a person's behavior occurs?	YES	NO
2.	Is a negative removed?	YES	NO
3.	Is a negative removed immediately after a behavior occurs?	YES	NO
4.	Is a negative removed everytime the behavior occurs?	YES	NO

Is this an example of a negative reinforcement procedure? YES NO

a.

1. Does the procedure result in an increase in the number of times a person's behavior occurs? YES (NO)
2. Is a negative removed? (YES) NO (doing the rest of the chores)
3. Is a negative removed immediately after a behavior occurs? YES (NO)
4. Is a negative removed everytime the behavior occurs? YES (NO)

Is this an example of a negative reinforcement procedure? YES (NO)

The problem here is that the negative of not having to do the chores is <u>not</u> removed immediately after Karen did the three chores. For this to be an example, the negative should have been removed after Karen did the chores instead of being told at the beginning of the week that she only had to do three.

b.

1. Does the procedure result in an increase in the number of times a person's behavior occurs? (YES) NO (doing chores)
2. Is a negative removed? (YES) NO (doing the rest of the chores)
3. Is a negative removed immediately after a behavior occurs? (YES) NO
4. Is a negative removed everytime the behavior occurs? (YES) NO

Is this an example of a negative reinforcement procedure? (YES) NO

The Richard's were able to increase the number of chores Tim did by removing the negative of having to do so many <u>after</u> he had completed three of them.

Please reread the definition of *negative reinforcement procedures*.

> *Negative reinforcement procedures:* A negative is removed immediately after and every time a person's behavior occurs. This procedure results in an increase in the number of times a person's behavior occurs.

Try to decide if the following procedures are examples or non-examples of *negative reinforcement procedures* by asking yourself whether each of the four important properties are present. Then turn the page to see if you are right. No peeking.

a. Ann was a new second grade student. Ann would generally sit facing the wall and would not pay attention in class. Mr. Patterson, the guidance counselor, had worked with other children with problems similar to Ann's and had found the following approach very successful. He had installed in his office a loud, piercing, highly-disturbing, whistle which he could turn on and off from behind his desk. Each time Ann walked into Mr. Patterson's office, the whistle would be already turned on. When she turned to face Mr. Patterson, he would turn off the whistle. At the beginning of every meeting, Mr. Patterson would wait for Ann to turn towards him before he would turn the whistle off. Since Ann really hated to hear the whistle, she began to sit and face Mr. Patterson much more often than before Mr. Patterson began using the whistle device.

Is this an example of negative reinforcement procedures? YES NO

b. Art was referred to the school psychologist because he always faced away from his teacher during class. The psychologist tried a procedure where every time Art would walk into his office he would hear a loud, disturbing whistle. Every visit the psychologist would wait until Art turned to face her before turning the whistle off. Since Art really liked the sound of the psychologist's whistle (it reminded him of trains), he did not increase the number of times he faced the school psychologist.

Is this an example of negative reinforcement procedures? YES NO

a.

1.	Does the procedure result in an increase in the number of times a person's behavior occurs?	(YES) NO	(facing counselor)
2.	Is a negative removed?	(YES) NO	(whistle)
3.	Is a negative removed immediately after a behavior occurs?	(YES) NO	Is this an example of a negative reinforcement procedure?
4.	Is a negative removed everytime the behavior occurs?	(YES) NO	(YES) NO

Since all four important properties are present, this is an example. The negative whistle was removed immediately after each time Ann faced Mr. Patterson.

b.

1.	Does the procedure result in an increase in the number of times a person's behavior occurs?	YES (NO)	
2.	Is a negative removed?	YES (NO)	
3.	Is a negative removed immediately after a behavior occurs?	YES (NO)	Is this an example of a negative reinforcement procedure?
4.	Is a negative removed everytime the behavior occurs?	YES (NO)	YES (NO)

Since Art liked the sound of the whistle, the whistle was not a negative. Since no negative is removed, the procedure is a non-example.

Remember, if a negative isn't removed <u>each time</u> the behavior occurs then a procedure is not an example. Also, *negative reinforcement procedures* are used to <u>increase</u> not decrease a behavior.

You have also learned something about *procedures for increasing behavior*, *positive reinforcement procedures*, and *negative reinforcement procedures*. The following are statements about the relationships among these procedures.

1. All procedures for increasing behavior are either positive reinforcement procedures or negative reinforcement procedures.

   That is, all positive reinforcement procedures and negative reinforcement procedures are used to increase the number of times a person's behavior occurs. They are subsets of procedures for increasing behavior.

2. Only some procedures for increasing behavior are positive reinforcement procedures.

   The more general procedures for increasing behavior is also made up of negative reinforcement procedures.

3. All negative reinforcement procedures are also procedures for increasing behavior.

4. No positive reinforcement procedures are also negative reinforcement procedures.

   They are different procedures.

Almost everyone has heard of *punishment procedures*. These procedures are used to decrease the number of times a person's behavior occurs. The definition of *punishment procedures* is:

> *Punishment procedures:* A person is given a punisher immediately after and every time the person's behavior occurs. This procedure is used to decrease the number of times a person's behavior occurs.

A punisher is something that you give to a person which will help eliminate the person's behavior. You might spank a child for being naughty; yell at someone for being cruel; or ridicule a friend for saying something stupid. These would be examples of punishers. They are things that the person you are giving them to dislikes.

The important properties of *punishment procedures* are:

1. The procedure is used to decrease the number of times a person's behavior occurs.
2. A punisher is given.
3. A punisher is given immediately after the person's behavior occurs.
4. A punisher is given every time the person's behavior occurs.

a. Tom's younger brother Ed had begun to swear at Tom quite often during the past three months. One day, Tom reached his limit and punched Ed in the face. He said: "From now on each time you swear at me, I'll smash you twice as hard as I just did." Ed did swear at Tom occasionally and would get hit each time. Finally, Ed completely stopped swearing.

1.	Is the procedure used to decrease the number of times a person's behavior occurs?	YES	NO	
2.	Is a punisher given?	YES	NO	
3.	Is a punisher given immediately after the person's behavior occurs?	YES	NO	
4.	Is a punisher given every time the person's behavior occurs?	YES	NO	Is this an example of a punishment procedure? YES NO

b. Jill had been swearing at her older sister Beth for over three months. Beth found that by refusing to let Jill use any of her clothes immediately after each time Jill swore at her, Jill eventually stopped swearing at her.

1.	Is the procedure used to decrease the number of times a person's behavior occurs?	YES	NO	
2.	Is a punisher given?	YES	NO	
3.	Is a punisher given immediately after the person's behavior occurs?	YES	NO	
4.	Is a punisher given every time the person's behavior occurs?	YES	NO	Is this an example of a punishment procedure? YES NO

a.

1. Is the procedure used to decrease the number of times a person's behavior occurs? (YES) NO (swearing)
2. Is a punisher given? (YES) NO (punch in face)
3. Is a punisher given immediately after the person's behavior occurs? (YES) NO
4. Is a punisher given every time the person's behavior occurs? (YES) NO

Is this an example of a punishment procedure? (YES) NO

All four important properties are present.

b.

1. Is the procedure used to decrease the number of times a person's behavior occurs? (YES) NO (swearing)
2. Is a punisher given? YES (NO)
3. Is a punisher given immediately after the person's behavior occurs? YES (NO)
4. Is a punisher given every time the person's behavior occurs? YES (NO)

Is this an example of a punishment procedure? YES (NO)

No punisher is being given. Jill stopped swearing because something (wearing her sister's clothes) was taken away. This kind of procedure will be discussed tomorrow.

a. Doris was known as the pusher in school. Any student who wanted any kind of drug could come to Doris. The school principal found out and decided some action had to be taken. From the janitor's window he could see Doris selling drugs after school. Whenever he did see her, he would call the police and wait with them at Doris's home until she arrived. The principal did not want to confront her at school because of the possible effects on other students. Although Doris hated talking with the police and going to juvenile court, she continued to sell drugs.

1.	Is the procedure used to decrease the number of times a person's behavior occurs?	YES	NO	
2.	Is a punisher given?	YES	NO	
3.	Is a punisher given immediately after the person's behavior occurs?	YES	NO	
4.	Is a punisher given every time the person's behavior occurs?	YES	NO	Is this an example of a punishment procedure? YES NO

b. Gareth was the chief drug dealer in his high school. The school principal was informed of this and decided to take some action. He could see Gareth selling drugs after school from the nurse's window. Whenever he did see a sale of drugs, he would contact a nearby cop and make an immediate bust. Gareth began to hate being busted and stopped selling drugs at school.

1.	Is the procedure used to decrease the number of times a person's behavior occurs?	YES	NO	
2.	Is a punisher given?	YES	NO	
3.	Is a punisher given immediately after the person's behavior occurs?	YES	NO	
4.	Is a punisher given every time the person's behavior occurs?	YES	NO	Is this an example of a punishment procedure? YES NO

a.

1. Is the procedure used to decrease the number of times a person's behavior occurs? (YES) NO (selling drugs)
2. Is a punisher given? (YES) NO (talking with police)
3. Is a punisher given immediately after the person's behavior occurs? YES (NO)
4. Is a punisher given every time the person's behavior occurs? (YES) NO

Is this an example of a punishment procedure? YES (NO)

This is a non-example because the punisher is not given immediately after Doris sold the drugs. The principal and police should have moved in right away and not have waited until Doris arrived home.

1. Is the procedure used to decrease the number of times a person's behavior occurs? (YES) NO (selling drugs)
2. Is a punisher given? (YES) NO (being busted)
3. Is a punisher given immediately after the person's behavior occurs? (YES) NO
4. Is a punisher given every time the person's behavior occurs? (YES) NO

Is this an example of a punishment procedure? (YES) NO

All four important properties are present.

Ask yourself whether each of the four important properties are present before answering the question. No peeking.

a. Craig got the biggest kick out of setting off the fire alarm in school. Every once in a while he would set it off and the school would empty out onto the sidewalk. Craig began to do it so often that his classmates began to get angry. They didn't like having to get up in the middle of class for fire alarms. Finally, several of Craig's classmates began to turn Craig in to the principal immediately after each time he set an alarm. Since Craig hated seeing the principal, he stopped setting alarms.

Is this an example of a punishment procedure? YES NO

b. Dotty really liked setting off the school's fire alarm. Dotty began to do it so often that some of her classmates became angry. They began to turn Dotty in to the principal immedately after each time she set an alarm. Dotty didn't mind seeing the principal because of the increased attention she received from her friends. Until something else was done, Dotty continued to set alarms.

Is this an example of a punishment procedure? YES NO

a.

1. Is the procedure used to decrease the number of times a person's behavior occurs? (YES) NO (setting alarms)
2. Is a punisher given? (YES) NO (seeing principal)
3. Is a punisher given immediately after the person's behavior occurs? (YES) NO
4. Is a punisher given every time the person's behavior occurs? (YES) NO

Is this an example of a punishment procedure? (YES) NO

You can see that a group of people can use a *punishment procedure* to decrease another person's behavior.

b.

1. Is the procedure used to decrease the number of times a person's behavior occurs? (YES) NO (setting alarms)
2. Is a punisher given? YES (NO)
3. Is a punisher given immediately after the person's behavior occurs? YES (NO)
4. Is a punisher given every time the person's behavior occurs? YES (NO)

Is this an example of a punishment procedure? YES (NO)

No punisher is given to Dotty after she set the alarms. A punisher must be something a person really dislikes and Dotty "didn't mind seeing the principal."

If you finish early, please reread the lesson paying special attention to the definitions of the procedures you have learned.

LESSON 3

Name _____

Date _____

Class _____

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Yesterday, you learned about two different procedures that are used to increase the number of times a person's behavior occurs.

Premack procedures:

> Definition: A person is permitted to participate in an activity the person really likes immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times the person's behavior occurs.

Negative reinforcement procedures:

> Definition: A negative is removed immediately after and every time a person's behavior occurs. This procedure results in an increase in the number of times a person's behavior occurs.

You also learned about *punishment procedures* which are used to decrease a behavior.

> Definition: A person is given a punisher immediately after and every time the person's behavior occurs. This procedure is used to decrease the number of times a person's behavior occurs.

Today you will learn about *withdrawal of reinforcer procedures.* You will remeber that a reinforcer is any object, event, or activity that a particular person likes. By taking away a reinforcer from a person, you can decrease the number of times a person's behavior occurs. The definition of *withdrawal of reinforcer procedures* is given below:

> A reinforcer is taken away immediately following every occurrence of a person's behavior. This procedure is used to decrease the number of times a behavior occurs.

As will be seen, *withdrawal of reinforcer procedures* are generally used to decrease a person's problem behavior.

The important properties of *withdrawal of reinforcer procedures* are:

1. The procedure is used to decrease the number of times a person's behavior occurs.
2. A reinforcer is taken away
3. A reinforcer is taken away immediately after the person's behavior occurs.
4. A reinforcer is taken away every time the person's behavior occurs.

a.

this is an example

Troy was known as the class "bully." He was always kicking someone, or picking a fight. The members of the hockey team he was on decided that Troy was bothering too many people with his fighting and should be stopped. From then on, they refused to let Troy practice with them immediately following each time he got into a fight. Since Troy really liked to play hockey, he quit pushing people around.

b.

this is a non-example

Tom was a new tenth-grader. To make a name for himself, he would always get in fights--mostly with person's younger than he. A few seniors decided Tom's fighting should be stopped. Every time that Tom would rough up someone smaller or younger than he, the seniors would push him around immediately after. Tom disliked being picked on and pushed around and began to stop fighting.

In example "a", Troy's hockey team stopped Troy from fighting in school by taking away the privilege of practicing with them immediately following each time he got into a fight.

In non-example "b", nothing is being taken away. Rather, Tom is given a punisher (being pushed around) immediately following every time he got into a fight. You may recognize this as a *punishment procedure*.

a. Scott was developing a bad habit that his mother wanted to stop. Whenever his mother was having a conversation with a friend, or with one of Scott's brothers or sisters, he would interrupt her by asking some kind of question. She thought the best approach to the problem was to simply ignore Scott whenever he interrupted her. While Scott continued to interrupt her at first, eventually, unable to get the attention of his mother, he began to wait until she had finished talking before he asked his question.

this is an example

b. Jim thought his son, Rich, was a pretty neat kid and took him to many different places. Rich did, however, have one habit that really bothered his dad. Whenever Jim was having a conversation with a friend, or with one of Rich's brothers, Rich would interrupt him by asking a question or offering an opinion. Jim felt that the best approach to this problem was to simply ignore Rich whenever he interrupted him. So every once in awhile Jim would ignore Rich when Rich would break in to a conversation he was having. Because Jim failed to ignore Rich everytime Rich interrupted him, Rich continued his bad habit.

this is a non-example

In example "a", the reinforcer that is being taken away from Scott is his mother's attention. By ignoring Scott each time he interrupted her, his mother was able to stop Scott from interrupting.

In non-example "b", the important property that is missing is that Rich's father did not ignore Rich every time Rich interrupted him, not just "once in awhile."

Please reread the definition of *withdrawal of reinforcer procedures*.

Withdrawal of reinforcer procedures: A reinforcer is taken away immediately following every occurrence of a person's behavior. This procedure is used to decrease the number of times a behavior occurs.

a.

this is an example

Larry found what he thought was a neat way to bother his younger sister at the dinner table. His sister hated the sound of silverware grating together. Whenever Larry wanted to upset his sister, all he had to do was rub his knife and fork together. When Larry continued to bother his sister in this fashion, his father told him that every time he rubbed silverware together, he would not be able to watch television immediately after. This was upsetting to Larry who loved to watch television and he soon stopped clanging his silverware to bother his sister.

b.

this is a non-example

Cindy found that she could upset her younger sister Wendy by simply letting her fork rub against her teeth when eating. Cindy would usually do this once a meal. Even after Cindy's parents asked her to stop she continued to upset her sister. Her father decided that each time Cindy bothered her sister, he would not allow her to watch an hour of television on the weekend. While Cindy hated to miss watching television on the weekend, she continued to bother her sister.

"a" is an example because a reinforcer (watching television) is taken away immediately after Larry bothered his sister.

The problem in non-example "b" is that Cindy's father did not take away one hour of televion viewing immediately after Cindy bothered her sister. He took it away on the weekend. For this to be an example, he should have taken away the hour on the particular day that Cindy bothered her sister.

Remember, *withdrawal of reinforcer procedures* are used to <u>decrease</u> the number of times a person's behavior occurs.

Over the past two days, you have learned about *procedures for decreasing behavior*, *punishment procedures*, and *withdrawal of reinforcer procedures*. By answering the questions on this page, and by reading their answers and explanations on the next page, the relationships among these similar procedures will become clearer. Circle the letter next to the correct answer.

1. Are all procedures for decreasing behavior either punishment procedures or withdrawal of reinforcer procedures?

   a. No, only some of them are either punishment procedures or withdrawal of reinforcer procedures.

   b. No, none of them are either punishment procedures or withdrawal of reinforcer procedures.

   c. Yes, all of them are either punishment procedures or withdrawal of reinforcer procedures.

2. Are all procedures for decreasing behavior also punishment procedures?

   a. Yes, all of them are punishment procedures.

   b. No, only some of them are punishment procedures.

   c. No, none of them are punishment procedures.

3. Are all withdrawal of reinforcer procedures also procedures for decreasing behavior?

   a. Yes, all of them are procedures for decreasing behavior.

   b. No, none of them are procedures for decreasing behavior.

   c. No, only some of them are procedures for decreasing behavior.

4. Are all punishment procedures also withdrawal of reinforcer procedures?

   a. No, only some of them are withdrawal of reinforcer procedures.

   b. Yes, all of them are withdrawal of reinforcer procedures.

   c. No, none of them are withdrawal of reinforcer procedures.

Here are the answers.

1. Are all procedures for decreasing behavior either punishment procedures or withdrawal of reinforcer procedures?

   c. Yes, all of them are either punishment procedures or withdrawal of reinforcer procedures.

   That is, procedures that are used to decrease the number of times a person's behavior occurs are made up of two subsets: punishment procedures and withdrawal of reinforcer procedures.

2. Are all procedures for decreasing behavior also punishment procedures?

   b. No, only some of them are punishment procedures.

   The more general procedures for decreasing behavior are also made up of withdrawal of reinforcer procedures.

3. Are all withdrawal of reinforcer procedures also procedures for decreasing behavior?

   a. Yes, all of them are procedures for decreasing behavior.

4. Are all punishment procedures also withdrawal of reinforcer procedures?

   c. No, none of them are withdrawal of reinforcer procedures.

   They are two different procedures.

Another kind of procedure that is used to decrease the number of times a behavior occurs is called *extinction procedures*. Its definition is given below:

> *Extinction procedures:* A reinforcer that used to be given following a person's behavior is taken away. The reinforcer is taken away immediately following every time the person's behavior occurs. This procedure is used to decrease a person's behavior.

The important properties of *extinction procedures* are:

1. The procedure is used to decrease a behavior.

2. A reinforcer that used to be given following the behavior is taken away.

   Suppose that every time you cracked a joke in class everyone laughed. If you liked people to laugh at your jokes, laughing would be a reinforcer. You would crack jokes because you knew you would be given a reinforcer by your class. If your teacher thought that your joking should be stopped, she might be able to convince the rest of the class to quit laughing when you joked. This is what the second important property means. A reinforcer (laughing) that used to be given following the behavior (cracking a joke) is taken away.

3. A reinforcer is taken away immediately following the person's bheavior.

4. A reinforcer is taken away each time the behavior occurs.

Extinction procedures are used by many people who are responsible for, and concerned with other people's lives. A mother ignores (takes away attention) from her child to reduce whining. Teacher's take away points on an exam when students perform poorly. If you stop answering your phone, the person will soon stop calling.

The following examples and non-examples will show how *extinction procedures* are used.

Here, an *extinction procedure* is used with younger children.

this is an example

a. Julie found that she could get her mother's attention by whining. Whenever she wanted her mother to talk to her all she had to do was whine. Eventually Julie's mother had enough of Julie's whining and decided to do something about it. Every time Julie whined her mother would ignore her. Eventually Julie stopped whining because her mother no longer responded to it.

this is a non-example

b. Tim found that all he had to do to get his mother's attention was to whine. He would whine things such as: "Mom, I want candy"; "Do I have to go to school?", "I don't feel good Mom." Tim's mother finally became fed up. She told Tim "From now on, every time you whine, you will have to come in twenty minutes earlier from playing with your friends." After Tim whined a couple of more times and lost playing time with his friends, he decided to quit crying.

In example "a", the reinforcer that used to be given when Julie whined was her mother's attention. Julie knew she could get her mother's attention by whining. When her mother stopped giving her attention (reinforcer taken away) every time Julie whined, Julie stopped whining.

In non-example "b", the reinforcer (playing with friend) that is taken away was not one that used to be given to Tim whenever he whined. Remember, for this to be an example, the reinforcer that is taken away, must be one that used to be given following the behavior that is to be decreases.

a. this is an example

Joe was 16 years old and never seemed to have enough money. He would constantly nag his parents until they gave him the amount of money he wanted. Eventually Joe's parents became extremely disturbed by Joe nagging them for money. They decided to stop giving Joe money every time he nagged. Finding that he never received money anymore when he nagged, Joe stopped nagging for money.

b. this is a non-example

Jill was 17 years old and was in constant need of money. She was always asking her parents for money, which her parents would usually give. They decided to stop giving Jill money every time she nagged. While her mother always would refuse when asked for money, her father would sometimes give in. As a result, Jill continued to nag for money.

In example "a", Joe's parents got him to stop nagging for money by refusing to give him money each time he asked.

The problem in non-example "b" is that the reinforcer (money) was not taken away every time Jill nagged ("her father would sometimes give in").

Here, again, is the definition of *extinction procedures:*

Extinction procedures: A reinforcer that used to be given following a person's behavior is taken away. The reinforcer is taken away immediately following every time the person's behavior occurs. This procedure is used to decrease a person's behavior.

a. Christine was a complainer. She would tell her father all about her current aches and pains. Her tooth hurt; she had a headache; she felt dizzy. Whenever she complained, her father would become very concerned and would spend long periods of time with her. The family physician indicated that there wasn't apparently anything physically wrong with her. He recommended ignoring Christine to see if her complaints were really a way to get attention from her father. After three weeks of ignoring his daughter every time she complained, Christine's father found that she greatly reduced the number of times she complained.

this is an example

b. Dotty loved to complain. She would say things like "I don't like what you served for dinner, Dad"; "I don't like my bedroom", and "I hate to go to school' to mention just a few. Whenever she did complain, her parents would become very bothered and disturbed. To try to stop Dotty from complaining, they decided to ignore her every time she complained about something. Unfortunately, Dottie really wasn't complaining to get attention from her parents. She didn't like their attention all that much. She complained to get out of doing things. Her parents ignoring her did little to decrease the number of times she complained.

this is a non-example

In example "a", Christine complained to get more attention from her father, not because she felt sick. By ignoring her complaints (reinforcer following behavior is taken away), her father was able to reduce the number of times she complained.

In non-example "b", Dotty didn't like receiving attention all that much. Attention is not, for her, a reinforcer. Therefore, no reinforcer that used to be given whenever she complained is atken away.

Remember, *extinction procedures* are used to <u>decrease</u> a behavior. Also, a reinforcer must be taken away <u>immediately</u> <u>following</u> the behavior.

Another kind of procedure that is used to decrease a person's behavior is *response cost procedures*. A definition is provided below:

> *Response cost procedures:* A person is fined immediately following each time the person's behavior occurs. This procedure results in a decrease in the number of times the person's behavior occurs.

The important properties of *response cost procedures* are:

1. The procedure is used to decrease a person's behavior.
2. A person has to pay a fine.
3. A person is fined immediately after the person's behavior occurs.
4. A person is fined each time the person's behavior occurs.

This procedure is based on a fairly simple idea. If a person has to pay a fine after having done something wrong, the person will probably be less likely to do it again. A fine usually involves paying or giving up a certain amount of something. A fine can be paying a certain amount of money, losing points on an exam, or having to give up a certain amount of free time.

By responding (behaving) undesirably, you may have to pay the cost (fine).

Some examples and non-examples will show how the procedure is used. As will be seen, *response cost procedures* are generally used by people who have responsibility and some control over other people's lives (i.e.) teachers, parents, school counselors.

a. Frank, a 10th grader, was having problems in school. One of his greatest problems was failing to complete his homework assignments. His teacher worked out the following procedure for dealing with this problem. For every page of homework he failed to complete, Frank would have to give up five minutes of free time. During the following weeks, Frank lost considerable amounts of free time. Eventually, missing free time became so distressing to Frank that he began to complete more and more of his assignments.

this is an example

b. Ben didn't like school very much. Most of all he hated homework. His teacher told Ben that every time he failed to do his homework, she would write a note home. The note, she said, would have to be signed by his parents before coming back to class. Ben disliked being embarrassed in front of his parents and began to complete his homework assignments.

this is a non-example

In example "a", Frank's teacher got Frank to do his homework by fining him five minutes of free time immediately following every time he failed to complete a page.

In non-example "b", Ben is not made to pay a fine. Rather, he is given a punisher (sending a note home) every time he didn't do his homework. This is an example of a *punishment procedure*.

a.

this is a non-example

Willa, a 17 year old, was causing her parents a great deal of unhappiness by coming in after curfew. If her parents said to be home at 9 o'clock she would arrive at 10. Her parents found a way to lessen the number of times Willa came home late. They told her that for every minute she was late, she would have to give them 2¢ of her allowance. The did this every time Willa was late. Willa began to arrive exactly at the predetermined time.

b.

this is an example

Claire, a junior in high school, simply refused to return from her friend's house when her mother told her she had to. Sometimes her mother really didn't mind and other times she would become really angry. She would tell Claire at the end of every week that she had to pay a certain amount of money for every time she was late during the week. Claire continued to arrive home late.

In example "a", Willa's parents were able to stop Willa from coming in late by fining her two cents immediately following each time she arrived home a minute late.

The problem in non-example "b" is that Claire's mother did not fine Claire immediately after Claire arrived home late. She fined her at the end of the week. For this to be an example, Claire should be fined right after she showed up late.

Please reread the definition of *response cost procedures.*

Response cost procedures: A person is fined immediately following each time the person's behavior occurs. This procedure results in a decrease in the number of times the person's behavior occurs.

a. Cindy was referred to the school counselor for being truant. She had missed over 10 days of school in the past six weeks of school and was falling far behind in her classes. The school counselor found out that Cindy always attended school on those days that she had traffic patrol. Cindy was told that for every day she missed school she would have to miss her next turn on traffic patrol. Since Cindy enjoyed traffice patrol, she began to attend school on a more regular basis.

this is an example

b. Harry loved to play hookie from school. He had missed over three weeks of class. Try as she could, the school counselor could not figure out a way to get Harry to come to school. Whenever Harry came to his classes his teachers would lavishly praise him for coming and allow him special privileges in the hope that he would come more often. Since all of this did little in getting Harry to attend school more often, the school counselor tried a new approach. She suspected that Harry was playing hookie because of all the attention he would receive from his parents and teachers when he did. She told his teachers and parents to try to ignore Harry whenever he played hookie. Sure enough, Harry started coming to school more often. It became clear that Harry liked lots of attention, and the only way he could get it was by coming to school.

this is a non-example

In example "a", by fining Cindy immediately after each time she missed school, the school counselor was able to get Cindy to attend school more often.

Non-example "b" is an example of an *extinction procedure*. A reinforcer (teacher's and parent's attention) that used to be given following Harry's behavior (missing school) is taken away.

Remember, *response cost procedures* are used to <u>decrease</u> a behavior. A person must be fined <u>every time</u> the behavior occurs.

Today you have learned about *withdrawal of reinforcer procedures*, *extinction procedures*, and *response cost procedures*. There are certain relationships that exist among these three procedures. By answering the following questions, these relationships will become clearer. The answers appear on the following page.

1. Are all withdrawal of reinforcer procedures either extinction procedures, or response cost procedures?

   a. Yes, all of them are either extinction procedures or response cost procedures.

   b. No, only some of them are either extinction procedures or response cost procedures.

   c. No, none of them are either extinction procedures or response cost procedures.

2. Are all withdrawal of reinforcer procedures also response cost procedures?

   a. Yes, all of them are response cost procedures.

   b. No, none of them are response cost procedures.

   c. No, only some of them are response cost procedures.

3. Are all extinction procedures also withdrawal of reinforcer procedures?

   a. No, none of them are withdrawal of reinforcer procedures.

   b. No, only some of them are withdrawal of reinforcer procedures.

   c. Yes, all of them are withdrawal of reinforcer procedures.

4. Are all extinction procedures also response cost procedures?

   a. No, none of them are response cost procedures.

   b. Yes, all of them are response cost procedures.

   c. No, only some of them are response cost procedures.

Here are the answers.

1. Are all withdrawal of reinforcer procedures either extinction procedures or response cost procedures?

   a. Yes, all of them are either extinction procedures or response cost procedures.

   Withdrawal of reinforcer procedures are composed of two subsets: extinction procedures and response cost procedures.

2. Are all withdrawal of reinforcer procedures also response cost procedures?

   c. No, only some of them are response cost procedures.

   The more general set of withdrawal of reinforcer procedures is also made up of the subset of extinction procedures.

3. Are all extinction procedures also withdrawal of reinforcer procedures?

   c. Yes, all of them are withdrawal of reinforcer procedures.

4. Are all extinction procedures also response cost procedures?

   a. No, none of them are response cost procedures.

   They are different procedures. One involves having someone pay a fine while the other involves taking away a reinforcer that was previously given.

Nice work! You made it through. If you have time, please look over the lessons paying special attention to those pages that introduce each procedure as well as page 1.

APPENDIX C

Advance Organizers

ADVANCE ORGANIZER 1

Name _____

Date _____

Class _____

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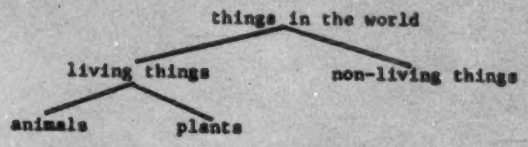
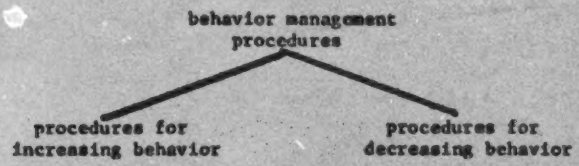
A taxonomy is a way of distinguishing, ordering, and naming groups of related things or ideas. The following is an example of a taxonomy of all things in the world.



This taxonomy shows that living things and non-living things are subsets of all things in the world. Plants and animals are subsets of living things.

In taxonomies, the things or ideas that are lower down in the taxonomy are also examples of things higher in the taxonomy. All animals are also living things. All non-living things are also things in the world. Make sure you understand what has been said, before going on.

There are two subsets of *behavior management procedures* that people use. They are presented in the taxonomy below.



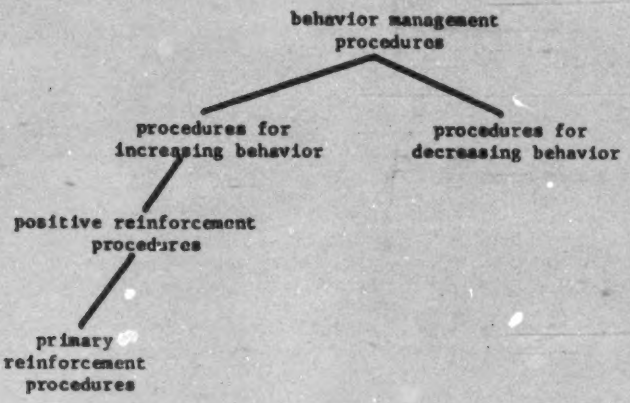
One subset is *procedures for increasing behavior*. They are used by a person to increase the number of times a person's behavior occurs. Examples of particular behavior which people want to increase are "making one's bed," "handing in assignments on time," and "getting a friend to keep a promise."

The other subset is *procedures for decreasing behavior*. These *behavior management procedures* are used to decrease the number of times a person's behavior occurs. A teacher may think that smoking pot before class is a behavior that ought to be stopped. A girl may be making herself "overly attractive" to boys and her friends may want to eliminate what they consider to be a problem behavior.

In the following lesson, you will learn about a subset of *procedures for increasing behavior* called *positive reinforcement procedures*. All *positive reinforcement procedures* are also *procedures for increasing behavior*.

You will also learn about a subset of *positive reinforcement procedures* called *primary reinforcement procedures*. All *primary reinforcement procedures* are also *positive reinforcement procedures*.

Both *positive reinforcement procedures* and *primary reinforcement procedures* are added to the *behavior management* taxonomy.



Study this taxonomy carefully. It will help you in understanding and remembering procedures you are about to learn.

Now turn to Lesson 1.

ADVANCE ORGANIZER 2

Name _____

Date _____

Class _____

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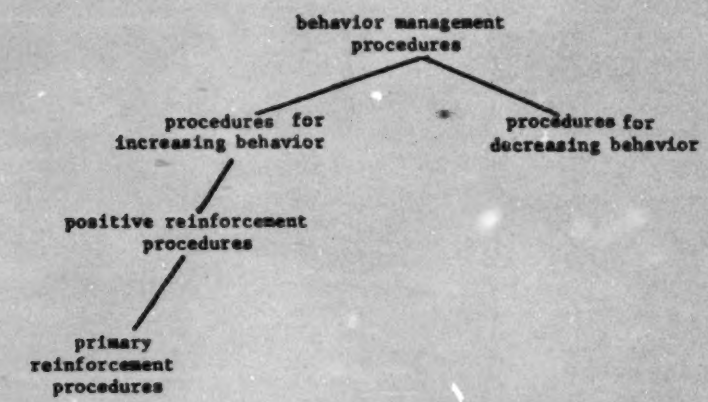
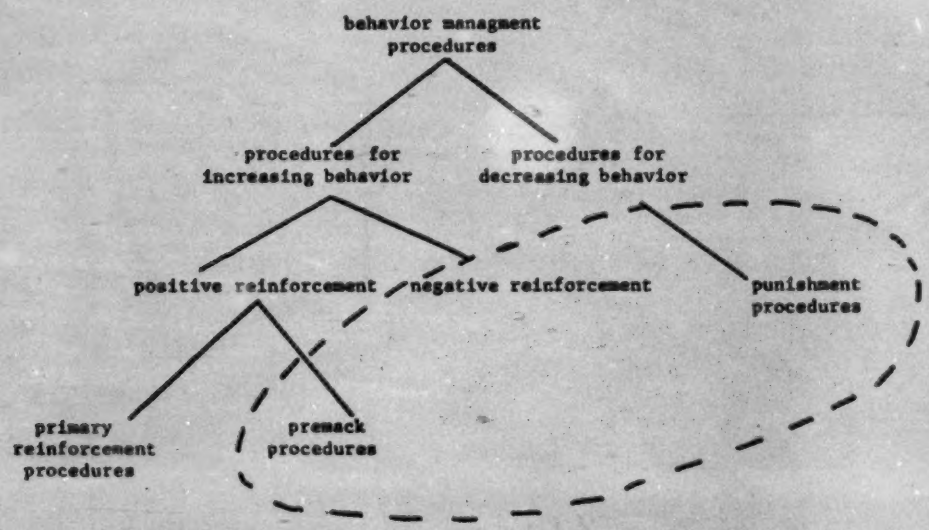
Yesterday, you learned something about the following five different procedures that are presented in the taxonomy below.



The most general of them are *behavior management procedures*. There are either *procedures to increase behavior* or *procedures to decrease behavior*. You learned that *positive reinforcement procedures* is a subset of *procedures for increasing behavior*. Also, *primary reinforcement procedures* are a subset of *positive reinforcement procedure*.

Today you will learn about two other procedures that are used to increase a behavior, and one procedure that is used to decrease the number of times a behavior occurs. The new procedures are presented in the oval that is in the taxonomy below.



Premack procedures are also a subset of *positive reinforcement procedure*. *Positive reinforcement procedures* are either *primary reinforcement procedures* or *premack procedures*.

Another subset of *procedures for increasing behavior* is *negative reinforcement procedures*. *Procedures for increasing behavior* are either *positive reinforcement procedures* or *negative reinforcement procedures*.

Finally, you will learn about one kind of *procedure for decreasing behavior* called *punishment procedures*.

Again, study the new taxonomy carefully. It will help you to distinguish among the procedures you will learn in Lesson 2.

Now turn to Lesson 2.

ADVANCE ORGANIZER 3

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Date _____

Class _____

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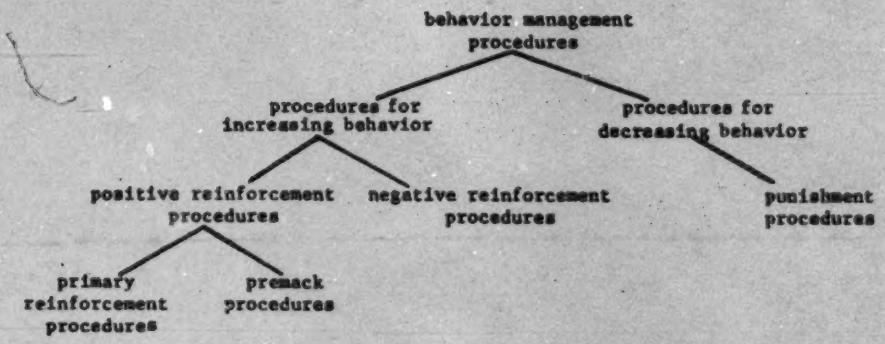
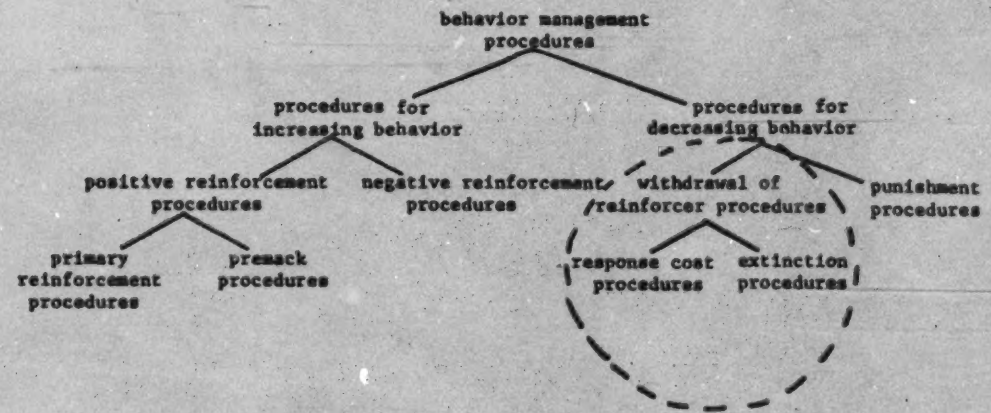
Over the past two days, you learned something about the following eight different procedures.



Remember the higher a procedure is in the above taxonomy, the more general it is. *Behavior management procedures* are more general than *procedures for increasing behavior*. *Positive reinforcement procedures* are more general than *premack procedures*.

Procedures that are lower in the taxonomy are subsets of those higher in the taxonomy. For instance, *punishment procedures* are subsets of *procedures for decreasing behavior*. *Primary reinforcement procedures* are examples of *positive reinforcement procedures*.

Today you will learn about three other kinds of *procedures for decreasing behavior*. The three new procedures appear in the circle in the taxonomy below.



Withdrawal of reinforcer procedures are a subset of *procedures for decreasing behavior*. *Response cost procedures* and *extinction procedures* are subsets of *withdrawal of reinforcer procedures*.

Look at the taxonomy carefully. Now turn to Lesson 3.

APPENDIX D

Assessment Measures*

*CMT = Concept Mastery Test

URT = Understanding Relationships Test

CTxT = Concept Taxonomy Test

CMT

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Circle the letter on your answer sheet that is the best answer. There is is only one correct answer.

1. What is the definition of *positive reinforcement procedures?*

   a. A person is given a reinforcer immediately after and every time the person's behavior occurs. This procedure is used to decrease the number of times a person's behavior occurs.

   b. A reinforcer is taken away immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

   c. A person is given a reinforcer immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

   d. A reinforcer is taken away immediately after and every time the person's behavior occurs. This procedure is used to decrease the number of times a person's behavior occurs.

   e. I don't know.

2. Johnny loves to have his teacher compliment him on his work. Having his teacher compliment him is an example of giving Johnny a:

   a. negative reinforcer
   b. positive
   c. social reinforcer
   d. social punisher
   e. I don't know

3.

> Gini, who was in the eleventh grade, loved to bother her teacher by tapping her pencil on her desk. Her math teacher, Ms. Rosenthal, would always become terribly excited and upset. Another teacher told Ms. Rosenthal that he was pretty sure that if she could just ignore Gini whenever she tapped her pencil, after a while she would stop. For the next three weeks, Ms. Rosenthal refused to pay any attention to Gini when she was tapping her pencil. While this was extremely difficult for Ms. Rosenthal to do, by the end of the third week, Gini stopped her pencil tapping.

This is an example of a:

   a. response cost procedure
   b. extinction procedure
   c. premack procedure
   d. negative reinfocement procedure
   e. I don't know

4.

X. Dave, who was in eight grade, was referred to the guidance counselor for throwing food in the cafeteria. Since the counselor found that talking to Dave did little to stop him from throwing food, he decided to initiate the following plan: every time Dave threw food, the rest of his meal was taken away. Dave really liked most of the food served in the school cafeteria and so thought it best to stop throwing food so he could eat as much as he wanted.

Y. Patty was referred to the school psychologist for throwing food in the lunchroom. Since the school psychologist found that talking to Patty did little good, he decided on the following procedure: each time Patty was caught throwing food, she would be removed from the lunchroom and miss the rest of her lunch. Since Patty really didn't like eating lunch very much anyway, she continued to throw food just like she did before.

How is procedure "X" different from procedure "Y"?

a. In procedure "X", a reinforcer is taken away. In procedure "Y" it is not.

b. In procedure "X", a social reinforcer is taken away. In procedure "Y" it is not.

c. In procedure "X", a punisher is given. In procedure "Y" it is not.

d. Procedure "X" is used to decrease a person's behavior. Procedure "Y" is not.

e. I don't know.

5.

Mr. Foster, a seventh grade science teacher, found that try as he could, he was not able to get his science class to settle down to work. One day, he told the class that they could have ten extra minutes of whatever activity they wanted after class if they were settled in their seats when the bell rang. By the end of the week, each student was seated, ready to work, and remained fairly quiet throughout class. Each student was then able to select his/her favorite activity. (The students had study hall during the following hour).

This is an example of a:

a. response cost procedure
b. extinction procedure
c. primary reinforcement procedure
d. premack procedure
e. I don't know

6. What is the definition of *primary reinforcement procedures?*

   a. A person's favorite food or social reinforcers are taken away immediately after and every time the person's behavior occurs. This procedure is used to decrease the number of times a person's behavior occurs.

   b. A person is given favorite food or social reinforcers immediately after and every time the person's behavior occurs. is used to increase the number of times a person's behavior occurs.

   c. A reinforcer is taken away immediately after and every time the person's behavior occurs. This procedure is used to decrease the number of times a person's behavior occurs.

   d. A person is permitted to participate in an activity the person really likes immediately after every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

   e. I don't know.

7. Sharon hates to be criticized by her teacher.

   When Sharon's teacher criticizes her, she is giving Sharon a:

   a. social reinforcer
   b. extinguisher
   c. primary reinforcer
   d. punisher
   e. I don't know

8.

> Whenever Betty was finished studying in the family study each evening, she would leave it a mess. Her father told her that each time she straightened out the study before leaving, she could spend the next 30 minutes on the phone talking to whomever she liked. Betty liked the activity of talking on the phone and began to put away all her books and materials before leaving the study.

This is an example of a:

   a. negative reinforcement procedure
   b. response cost procedure
   c. primary reinforcement procedure
   d. premack procedure
   e. I don't know

9.

Dr. Spetter was seeing at his educational clinic a girl who was having learning problems. While he was making good progress with her in his weekly sessions, the fact that she generally failed to do the work he assigned her during the week slowed things down. At the beginning of each session, Dr. Spetter would walk Doris down to a nearby drugstore where he would buy her candy or ice cream. Knowing that Doris enjoyed this, he told her that each time she failed to do her homework assignment, she would not be allowed to walk with him to the store. Not wanting to miss either the walk or the treat, Doris began to do more of her assignments than before.

This is an example of a:

a. primary reinforcement procedure
b. withdrawal of reinforcer procedure
c. negative reinforcement procedure
d. positive reinforcement procedure
e. I don't know

10. Peter, who was sixteen, complained to his parents that his younger brother Eric was always doing things to bother him. When Eric would use Peter's things without asking, Peter would get upset and start yelling at Eric. Peter's mother suggested that Eric not get upset and should ignore Eric whenever Eric bothered him. She told Peter it was important to ignore his brother immediately following each time Eric bothered him. Peter tried this and, after a couple of weeks, Eric began to bother him less often.

This is an example of a(n):

a. punishment procedure
b. response cost procedure
c. negative reinforcement procedure
d. extinction procedure
e. I don't know

11. What is the definition of *extinction procedures?*

a. A reinforcer that used to be given following a person's behavior is taken away. The reinforcer is taken away immediately following every time the person's behavior occurs. This procedure is used to decrease a person's behavior.

b. A reinforcer is taken away immediately following every occurrence of a person's behavior. This procedure is used to decrease the number of times a behavior occurs.

c. A person is fined immediately following each time the person's behavior occurs. This procedure results in a decrease in the number of times the person's behavior occurs.

d. A person is permitted to participate in an activity the person really likes immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times the person's behavior occurs.

e. I don't know.

12. Ben disliked doing math problems for homework.

Telling Ben that he only had to do half as many math problems, is an example of a removal of a:

a. extinguisher
b. negative
c. math reinforcer
d. primary reinforcer
e. I don't know

13.

> Nancy liked to mouth-off at her baseball coach. Her coach was able to decrease the number of times Nancy mouthed-off. He knew that Nancy disliked being criticized. Therefore, he would yell at her and criticize her baseball ability whenever she mouthed-off.

This is an example of a:

a. premack procedure
b. punishment procedure
c. extinction procedure
d. withdrawal of reinforcer procedure
e. I don't know

14.

X.

> Fred owned an electric calculator that his friend Jan was always wanting to borrow. Fred told Jan she could borrow the calculator if each time she did Fred could use her new camera. Jan agreed and the two increased the number of times they traded possessions.

Y.

> Pete wanted to borrow several of Beth's new photography books. Beth told Pete he could borrow the books if she could use his stamp collection reference books. Although Pete agreed, he would not always let Beth use his stamp books after Beth lent him her photography books. Beth soon stopped lending Pete his books.

How is procedure "X" different from procedure "Y"?

a. In procedure "X", a reinforcer is given each time a behavior occurs. In procedure "Y", it is not.

b. In procedure "X", a reinforcer is taken away each time a behavior occurs. In procedure "Y", it is not.

c. Procedure "X" is used to increase a behavior. Procedure "Y" is not.

d. In procedure "X", a negative is taken away following a behavior. In procedure "Y" it is not.

e. I don't know.

15.

> Steve's father wanted him to increase the number of times he helped his younger brother with his homework. Steve told his father he would help his brother more often if each time he helped him he could watch whatever television program he wanted to immediately after.

In this procedure:

a. a reinforcer is taken away following a behavior
b. a punisher is given following a behavior
c. a reinforcer is given following a behavior
d. a negative is taken away following a behavior
e. I don't know

16. What is the definition of *premack procedures?*

a. A reinforcer that used to be given following a person's behavior is taken away. The reinforcer is taken away immediately following every time the person's behavior occurs. This procedure is used to decrease a behavior.

b. A negative is removed immediately after and every time a person's behavior occurs. This procedure results in an increase in the number of times a person's behavior occurs.

c. A person is given favorite food or social reinforcers immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

d. A person is permitted to participate in an activity the person really likes immediately after every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

e. I don't know.

17. Hugh liked to read about professional football.

Giving Hugh a professional football magazine is an example of giving an:

a. activity
b. primary
c. reinforcer
d. negative
e. I don't know

18.

Ms. Schilling was becoming increasingly bothered by her student, Ralph, who was always complaining to her. "I'm bored," "Can we leave yet," and I don't feel so good," he would say. Ms. Schilling would usually come over to Ralph when he complained and offer a sympathetic ear. She found, however, that when she ignored Ralph immediately following every time he complained, he soon stopped complaining.

This is an example of a:

a. punishment procedure
b. withdrawal of reinforcer procedure
c. premack procedure
d. negative reinforcement procedure
e. I don't know

19.

X. Steve had very sloppy handwriting. His sociology teacher told him that each time he wrote a neat paper, he could receive the next higher grade. Since earning good grades was important to Steve, he began to write more neatly.

Y Margie's writing was sloppy. Her psychology teacher told her that each time she wrote a sloppy paper, she would receive the next lower grade. Since earning good grades was important to Margie, she began to write more neatly.

How is procedure "X" different from procedure "Y"?

a. In procedure "X", a punisher is given following a behavior. In procedure "Y" it is not.

b. In procedure "X", a negative is taken away following a behavior. In procedure "Y" it is not.

c. In procedure "X", a reinforcer is given following a behavior. In procedure "Y" it is not.

d. Procedure "X", is used to increase a behavior. Procedure "Y" is not.

e. I don't know.

20.

> Tony's teacher, Ms. Reed, complained a great deal about Tony during class. Tony found that each time he left class to visit the school counselor, he could avoid being complained about in class. During the school year, Tony increased the number of trips he made to the counselor.

In this procedure:

a. a punisher is given when Tony left class
b. a reinforcer is given when Tony left class
c. a negative is taken away when Tony left class
d. a reinforcer is taken away when Tony left class
e. I don't know

21. What is the defintion of *negative reinforcement procedures*?

a. A negative is removed immediately after and every time a person's behavior occurs. This procedure results in an increase in the number of times a person's behavior occurs.

b. A negative is removed immediately after and every time a person's behavior occurs. This procedure results in a decrease in the number of times a person's behavior occurs.

c. A negative is presented immediately after and every time a person's behavior occurs. This procedure results in an increase in the number of times a person's behavior occurs.

d. A negative is presented immediately after and every time a person's behavior occurs. This procedure results in a decrease in the number of times a person's behavior occurs.

e. I don't know.

22.

> To the annoyance of his teacher, David would draw on the blackboard right before class. His teacher told David that each time he drew on the board, he would have to stay a half hour after school. Hating to miss intermurals which met after school, David stopped drawing on the board.

This is an example of a:

a. response cost procedure
b. negative reinforcement procedure
c. extinction procedure
d. premack procedure
e. I don't know

23.

X. Wes loved to pull pranks in school. His latest prank was to stop up the b[illegible]throom toilets. Wes was caught once or twice and was told [illegible]hat each time he pulled his prank, he would be thrown [illegible] basketball team for a week. Since Wes liked basketball, he stopped stopping up toilets.

Y. Patty was kind of a loner. Her classmates felt that Patty was a neat kid and decided to say all sorts of nice things to Patty each time she approached one of them during free period. Since Patty liked when her classmates were friendly to her, she began to be with them more often and be less of a loner.

a. In procedure "X", a reinforcer is given each time a behavior occurs. In procedure "Y", it is not.

b. In procedure "X", a person is permitted to participate in a favorite activity. In procedure "Y", a person is not.

c. In procedure "X", a pu[illegible]r is taken away each time a behavior occurs. In procedure "Y", it is not.

d. Procedure "X" is used to decrease a behavior. Procedure "Y" is not.

e. I don't know.

24.

Joan made a name for herself by fighting. A few of her field hocky team got tired of her fighting and refused to let her practice with them immediately following each time she got into a fight. Since Joan liked field hockey, she quit fighting.

In this procedure:

a. a negative is taken away following a behavior
b. a reinforcer is taken away following a behavior
c. a reinforcer is given following a behavior
d. a punisher is given following a behavior
e. I don't know

25. What is the definition of *punishment procedures?*

a. A person is given a punisher immediately after and every time the person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

b. A reinforcer is taken away immediately after and every time person's behavior occurs. This procedure is used to increase the number of times a person's behavior occurs.

c. A person is given a punisher immediately after and every time the person's behavior occurs. This procedure is used to decrease the number of times a person's behavior occurs.

d. A reinforcer is taken away immediately after and every time a person's behavior occurs. This procedure is used to decrease the number of times a person's behavior occurs.

e. I don't know.

26.

> Aaron was just beginning second grade. His teacher, Mr. Williams, could see that Aaron felt uncomfortable talking during class. He seemed afraid to answer any questions Mr. Williams might ask. One day, Mr. Williams told Aaron that every time Aaron raised his hand in class, Mr. Williams would give him an M & M chocolate candy. Mr. Williams knew that Aaron just loved M & M's. Pretty soon, Aaron began to raise his hand and answer questions.

This is an example of a:

a. primary reinforcement procedure
b. premack procedure
c. negative reinforcement procedure
d. withdrawal of reinforcement procedure
e. I don't know

27.

X. Brett was known as the class "apple-polisher." He was always doing things to get on his teacher's good side. One classmate, Larry, hated Brett for this and decided to put a stop to it. Each time Brett did something for his teacher, Larry would come up to him immediately after class, pull a knife and say "you'd better quit being so friendly with Ms. Jones, or I'm going to have some real fun with you." Pretty soon, Brett stopped "apple-polishing".

Y. Sue loved to do things for her teacher. Bernice hated Sue for this and would threaten Sue immediately after every time Sue did something nice for her teacher. Since Sue didn't at all mind Bernice's threats, she continued being friendly with her teacher.

How is procedure "X" different from procedure "Y"?

a. In procedure "X", a negative is taken away each time a behavior occurs. In procedure "Y", it is not.

b. Procedure "X" is used to decrease a behavior. Procedure "Y" is not.

c. In procedure "X", a punisher is given. In procedure "Y", it is not.

d. In procedure "X", a social reinforcer is taken away. In procedure "Y", it is not.

e. I don't know.

28.

Sherry loved to pull the principal's sign off his door. When one of her classmates found out, he turned her in to the principal immediately after each time she did it (to get even for something Sherry did to him). Since Sherry hated talking to the principal, she stopped pulling off his sign.

In this procedure:

a. to decrease a behavior, a punisher is given immediately after the behavior occurs
b. to increase a behavior, a negative is taken away immediately after the behavior occurs
c. to increase a behavior, a punisher is given immediately after the behavior occurs
d. to decrease a behavior, a negative is taken away immediately after the behavior occurs
e. I don't know

29. What is the definition of *response cost procedures*?

a. A person is given a punisher immediately after and every time a person's behavior occurs. This procedure is used to decrease the number of times a person's behavior occurs.

b. A reinforcer is taken away immediately following every occurrence of a person's behavior. This procedure is used to decrease the number of times a behavior occurs.

c. A reinforcer that used to be given following a person's behavior is taken away. The reinforcer is taken away immediately following every time the person's behavior occurs. This procedure is used to decrease a person's behavior.

d. A person is fined immediately following each time the person's behavior occurs. This procedure results in a decrease in the number of times the person's behavior occurs.

e. I don't know.

30.

> Sandy never missed much school until this year. Recently however, Sandy attended all her classes in the morning and then skipped school in the afternoon. Upon talking with Sandy, the school principal learned that Sandy hated her art class that met last period in the afternoon. She would take off right after lunch so she wouldn't have to go to art. The principal felt it was important for Sandy to be in her other afternoon classes. He told Sandy that each time she attended all her other classes she could spend art class in the library. Sandy thought this was a reasonable arrangement and began to attend her afternoon classes, except art, of course.

This is an example of a:

a. withdrawal of reinforcer procedure
b. positive reinforcement procedure
c. negative reinforcement procedure
d. response cost procedure
e. I don't know

31.

X. Bev skipped her first two morning classes because of her third period economics class which she hated. The school psychologist made a deal with her. Each time she came to her first two classes she could spend third period in study hall. Bev agreed and started coming to the first two morning classes.

Y. Jim skipped his afternoon classes because he hated to go to his seventh period Spanish class. The school psychologist told Jim that each time he missed a class, he would be forbidden to practice in the band. Jim liked band and decided to go to Spanish class.

How is procedure "X" different from procedure "Y"?

a. In procedure "X" a reinforcer is taken away after a behavior occurs. In procedure "Y" it is not.

b. In procedure "X" a negative is taken away after a behavior occurs. In procedure "Y" it is not.

c. Procedure "X" is used to increase a behavior. Procedure "Y" is not.

d. In procedure "X" a punisher is given after a behavior occurs. In procedure "Y" it is not.

e. I don't know.

32.

Joan complained that her parents never said anything pleasant to her. Her friend, Pat, suggested that each time they talked to her, she should say something nice to them ("you're really okay parents," "Sorry to cause you problems," etc.). Joan tried this approach and found that her parents started to be more friendly and would say nicer things to her.

This is an example of a:

a. negative reinforcement
b. withdrawal of reinforcer procedure
c. extinction procedure
d. positive reinforcement procedure
e. I don't know

33. What is the definition of *withdrawal of reinforcer procedure*?

a. A negative is removed immediately after and every time a person's behavior occurs. This procedure results in a decrease in the number of times a person's behavior occurs.

b. A reinforcer is taken away immediately following every occurrence of a person's behavior. This procedure is used to decrease the number of times a behavior occurs.

c. A reinforcer is taken away immediately following every occurrence of a person's behavior. This procedure is used to increase the number of times a behavior occurs.

d. A negative is removed immediately after and every time a person's behavior occurs. This procedure results in an increase in the number of times a person's behavior occurs.

e. I don't know.

34.

> Judy was known as the class clown. She was always making silly comments in the middle of class. Because of this, her teacher felt that Judy was paying much less attention to her in-class work than she should. Her teacher also felt that Judy made silly comments because her classmates gave her lots of attention by laughing. One day when Judy was sick, her teacher asked Judy's classmates if they would ignore Judy whenever she called out in class. This, it was explained, would help Judy in her classwork. The class agreed and started to ignore Judy whenever she made silly comments. Pretty soon Judy, unable to get her classmates attention, started to make fewer and fewer silly comments in class.

This is an example of a(n):

a. punishment procedure
b. extinction procedure
c. premack procedure
d. negative reinforcement procedure
e. I don't know

URT

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The following multiple-choice questions deal only with the material you may have read during the past couple of days. There are no trick questions. Each question has only one correct answer. Circle the letter next to the answer that seems most reasonable.

1. Are all procedures for increasing behavior also positive reinforcement procedures?
   a. Yes, all of them are positive reinforcement procedures.
   b. No, none of them are positive reinforcement procedures.
   c. No, only some of them are positive reinforcement procedures.
   d. I don't know.

2. Are all premack procedures also positive reinforcement procedures?
   a. No, only some of them are positive reinforcement procedures.
   b. No, none of them are positive reinforcement procedures.
   c. Yes, all of them are positive reinforcement procedures.
   d. I don't know.

3. Are all extinction procedures also response cost procedures?
   a. No, none of them are response cost procedures.
   b. Yes, all of them are response cost procedures.
   c. No, only some of them are response cost procedures.
   d. I don't know.

4. Are all procedures for decreasing behavior either withdrawal of reinforcer procedures or punishment procedures?
   a. No, only some of them are either withdrawal of reinforcer or punishment procedures.
   b. No, none of them are either withdrawal of reinforcer or punishment procedures.
   c. Yes, all of them are either withdrawal of reinforcer of punishment procedures.
   d. I don't know.

5. Are all procedures for increasing behavior also negative reinforcement procedures?
   a. No, only some of them are negative reinforcement procedures.
   b. Yes, all of them are negative reinforcement procedures.
   c. No, none of them are negative reinforcement procedures.
   d. I don't know.

6. Are all withdrawal of reinforcer procedures also response cost procedures?
   a. Yes, all of them are response cost procedures.
   b. No, none of them are response cost procedures.
   c. No, only some of them are response cost procedures.
   d. I don't know.

7. Are all negative reinforcement procedures also procedures for increasing behavior?
   a. No, only some of them are procedures for increasing behavior.
   b. Yes, all of them are procedures for increasing behavior.
   c. No, none of them are procedures for increasing behavior.
   d. I don't know.

8. Are all primary reinforcement procedures also premack procedures?
   a. No, only some of them are premack procedures.
   b. Yes, all of them are premack procedures.
   c. No, none of them are premack procedures.
   d. I don't know.

9. Are all punishment procedures also procedures for decreasing behavior?
   a. Yes, all of them are procedures for decreasing behavior.
   b. No, only some of them are procedures for decreasing behavior.
   c. No, none of them are procedures for decreasing behavior.
   d. I don't know.

10. Are all withdrawal of reinforcer procedures either extinction, or response cost procedures?
   a. Yes, all of them are either extinction or response cost procedures.
   b. No, only some of them are either extinction or response cost procedures.
   c. No, none of them are either extinction or response cost procedures.
   d. I don't know.

11. Are all procedures for increasing behavior either positive reinforcement or negative reinforcement procedures.

    a. Yes, all of them are either positive reinforcement or negative reinforcement procedures.

    b. No, only some of them are either positive reinforcement or negative reinforcement procedures.

    c. No, none of them are either positive reinforcement or negative reinforcement procedures.

    d. I don't know.

12. Are all withdrawal of reinforcer procedures also extinction procedures?

    a. Yes, all of them are extinction procedures.

    b. No, only some of them are extinction procedures.

    c. No, none of them are extinction procedures.

    d. I don't know.

13. Are all withdrawal of reinforcer procedures also procedures for decreasing behavior?

    a. Yes, all of them are procedures for decreasing behavior.

    b. No, none of them are procedures for decreasing behavior.

    c. No, only some of them are procedures for decreasing behavior.

    d. I don't know.

14. Are all positive reinforcement procedures also negative reinforcement procedures?

    a. No, only some are negative reinforcement procedures.

    b. No, none of them are negative reinforcement procedures.

    c. Yes, all of them are negative reinforcement procedures.

    d. I don't know.

15. Are all procedures for decreasing behavior also withdrawal of reinforcer procedures?
    a. No, only some of them are withdrawal of reinforcer procedures.
    b. Yes, all of them are withdrawal of reinforcer procedures.
    c. No, none of them are withdrawal of reinforcer procedures.
    d. I don't know.

16. Are all withdrawal of reinforcer procedures also punishment procedures?
    a. No, only some of them are punishment pr dures.
    b. Yes, all of them are punishment procedures.
    c. No, none of them are punishment procedures.
    d. I don't know.

17. Are all positive reinforcement procedures also primary reinforcement procedures?
    a. Yes, all of them are primary reinforcement procedures.
    b. No, none of them are primary reinforcement procedures.
    c. No, only some of them are primary reinforcement procedures.
    d. I don't know.

18. Are all primary reinforcement procedures also positive reinforcement procedures?
    a. Yes, all of them are positive reinforcement procedures.
    b. No, only some of them are positive reinforcement procedures.
    c. No, none of them are positive reinforcement procedures.
    d. I don't know.

19. Are all procedures for decreasing behavior also punishment procedures?
    a. Yes, all of them are punishment procedures.
    b. No, only some of them are punishment procedures.
    c. No, none of them are punishment procedures.
    d. I don't know.

20. Are all positive reinforcement procedures also procedures for increasing behavior?

    a. No, none of them are procedures for increasing behavior.

    b. Yes, all of them are procedures for increasing behavior.

    c. No, only some of them are procedures for increasing behavior.

    d. I don't know.

21. Are all positive reinforcement procedures either primary reinforcement procedures or premack procedures?

    a. No, only some of them are either primary reinforcement or premack procedures.

    b. Yes, all of them are either primary reinforcement or premack procedures.

    c. No, none of them are either primary reinforcement or premack procedures.

    d. I don't know.

22. Are all extinction procedures also withdrawal of reinforcer procedures?

    a. No, none of them are withdrawal of reinforcer procedures.

    b. No, only some of them are withdrawal of reinforcer procedures.

    c. Yes, all of them are withdrawal of reinforcer procedures.

    d. I don't know.

23. Are all response cost procedures also withdrawal of reinforcer procedures?

    a. No, none of them are withdrawal of reinforcer procedures.

    b. Yes, all of them are withdrawal of reinforcer procedures.

    c. No, only some of them are withdrawal of reinforcer procedures.

    d. I don't know.

24. Are all positive reinforcement procedures also premack procedures?

    a. No, none of them are premack procedures.

    b. Yes, all of them are premack procedures.

    c. No, only some of them are premack procedures.

    d. I don't know.

CTxT

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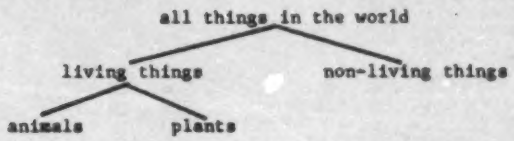
A taxonomy is a way of distinguishing, ordering, and naming groups of related things or ideas. The following is an example of a taxonomy of <u>all things in the world</u>.

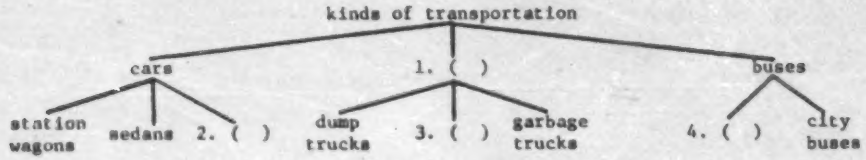


This taxonomy shows that all things in the world are made up of non-living things and living things. Living things are made up of animals and plants.

In many taxonomies such as this one, the things or ideas that are higher up in the taxonomy are more general than are ones lower in the taxonomy. All things in the world is a more general idea than living things or non-living things. Living things, in turn, is a more general idea than is the idea of plants or animals.

Now turn the page and look at another taxonomy.

This is a taxonomy of kinds of transportation:



For the following questions, draw a circle around the letter that indicates the correct answer.

1. Which of the following words best fills place number 1 in the taxonomy?
   a. pickup trucks
   b. airplanes
   c. trucks
   d. sailboats
   e. fire engines
   f. trains
   g. motorboats

2. Which of the following words best fills place number 2 in the taxonomy?
   a. tractors
   b. school buses
   c. motorcycles
   d. sports cars
   e. pick-up trucks
   f. trucks
   g. trains

3. Which of the following words best fills place number 3 in the taxonomy?
   a. school buses
   b. tractors
   c. sports cars
   d. wheel barrows
   e. trucks
   f. trains
   g. pick-up trucks

4. Which of the following words best fills place number 4 in the taxonomy?
   a. skate boards
   b. mom's car
   c. school bus
   d. motor scooters
   e. trains
   f. trucks
   g. pick-up trucks

Turn the page to see if you are right.

1. Which of the following words best fill fills place number 1 in the taxonomy?

   a. pickup trucks
   b. airplanes
   c. trucks
   d. sailboats
   e. fire engines
   f. trains
   g. motorboats

2. Which of the following words best fills place number 2 in the taxonomy?

   a. tractors
   b. school buses
   c. motorcycles
   d. sports cars
   e. pickup trucks
   f. trucks
   g. trains

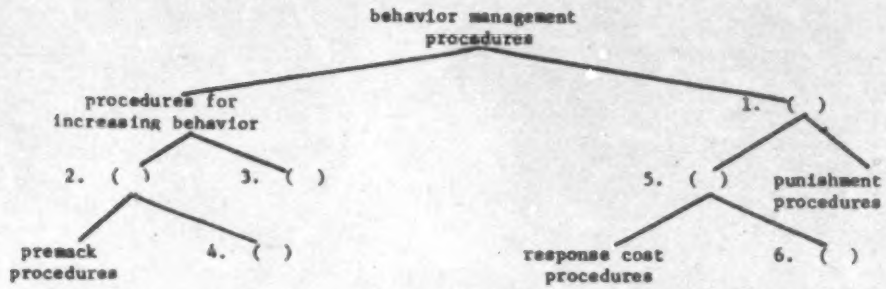
3. Which of the following words best fills place number 3 in the taxonomy?

   a. school buses
   b. tractors
   c. sports cars
   d. wheel barrows
   e. trucks
   f. trains
   g. pickup trucks

4. Which of the following words best fills place number 4 in the taxonomy?

   a. skate boards
   b. mom's car
   c. school buses
   d. motor scooters
   e. trains
   f. trucks
   g. pickup trucks

This is a taxonomy of behavior management procedures.



Hint: In answering the following questions, it helps to use the words that you fill the blanks with along the way as guides for answering other questions. If you do not know an answer, it is perfectly OK to circle I don't know.

1. Which of the following words best fills place number 1 in the taxonomy?

   a. positive reinforcement procedures
   b. procedures for increasing reinforcement
   c. procedures for maintaining behavior
   d. procedures for decreasing reinforcement
   e. procedures for decreasing behavior
   f. primary reinforcement procedures
   g. I don't know

2. Which of the following words best fills place number 2 in the taxonomy?

   a. negative reinforcement procedures
   b. withdrawal of reinforcer procedures
   c. time-out procedures
   d. extinction procedures
   e. positive reinforcement procedures
   f. primary reinforcement procedures
   g. I don't know

3. Which of the following words best fills place number 3 in the taxonomy?

   a. procedures for maintaining behavior
   b. positive reinforcement procedures
   c. extinction procedures
   d. withdrawal of reinforcer procedures
   e. procedures for increasing reinforcement
   f. negative reinforcement procedures
   g. I don't know

4. Which of the following words best fills place number 4 in the taxonomy?

   a. extinction procedures
   b. primary reinforcement procedures
   c. negative reinforcement procedures
   d. positive reinforcement procedures
   e. withdrawal of reinforcer procedures
   f. procedures for decreasing behavior
   g. I don't know

5. Which of the following words best fills place number 5 in the taxonomy?

   a. negative reinforcement procedures
   b. extinction procedures
   c. withdrawal of reinforcer procedures
   d. positive reinforcement procedures
   e. negative reinforcement procedures
   f. primary reinforcement procedures
   g. I don't know

6. Which of the following words best fills place number 6 in the taxonomy?

   a. extinction procedures
   b. procedures for increasing behavior
   c. primary reinforcement procedures
   d. negative reinforcement procedures
   e. withdrawal of reinforcer procedures
   f. positive reinforcement procedures
   g. I don't know

APPENDIX E

Instructions to Students

Good monring. My name is Michael Bernard. As Mr. _____ may have told you, I'm from the University of Wisconsin in Madison. I work at a Research Center in Madison that is concerned with examining the ways in which people learn. My interest is in developing teaching materials that will promote effective learning. In order to determine the effectiveness of instructional materials, I try them out with different groups of students such as yourselves.

Over the next four days you will be participating in an experiment the purpose of which is to determine the best way to present psychological material in written form. The experiment is also taking place in _____, _____ and _____. Students such as yourselves have read and will be reading different sets of basically the same material. In many instances, you will be reading material that is slightly different from the person sitting next to you. By seeing how each of you perform on assessment exercises that will be given on the fourth day of the experiment, I will be able to judge which set of materials lead to the greatest amount of learning.

Before proceeding to the actual experiment, I would like to give you a little background about the material most of you will be presented with. Have you ever thought about why people behave the way they do? Why do people dress the way they do, wear their hair in certain styles, behave well or poorly to friends, teachers,

parents, and why do they attend school? You might be thinking that we behave in certain ways because of social outside influences. That would be correct. In many instances, we behave in a certain way because of reactions of other people. Said in a slightly different way, the consequences of our behavior determines how we behave. If we do something that is followed by a good consequence, we will probably tend to do it again. If we do something that is followed by a bad consequence, we generally do not repeat the behavior. This is a fairly simple idea. You study hard for an exam because of the good consequences that generally follow (a high grade). You do not generally cut school because of the bad consequences that might follow (suspension, parents coming in for a teachers conference, restriction of privileges). You try out for a team or join a group because of the positive consequences that will probably follow (respect from friends, a chance to participate in new activities). We do not drink alchohol before a certain age (at least openly) because of the negative consequences that would follow if we are caught.

Psychologists have developed a number of procedures for changing the behavior of a person that are based on the idea that behavior results from its consequences. The group of procedures are called behavior management procedures. Over the next several days you will be learning about different kinds of behavior management procedures that can be used to change a variety of behaviors that people commonly engage in. I think you will find the procedures

of interest. Some of these procedures may have been used with you without your knowledge. You may be able to use some of the procedures in dealing with friends and family.

Others of you will be reading three different articles over the next days that deal with different aspects of people's learning and behavior. It is my feeling that you will find each one of them interesting. Today's article deals with why certain people have a more difficult time learning in school than others. People learn in different ways not only because of the consequences that follow learning, but also because of difference in the physical make-up of people. The article deals with the topic of learning disabilities.

A couple more things before we begin. One, while I do feel that the lessons that you will be reading are informative and interesting, they are not meant to be especially entertaining. The lessons require a good deal of reading. It is important that you try to read everything, even if things seem repetitious. As I mentioned, there will be an examination on the fourth day of the experiment on the material presented on the first three days. For those of you that have questions in your lessons, try to answer each one before looking at the answers that appear on the following page. Some of the lessons are longer than others. If you finish early, and many of you will, please reread the lesson making sure you understand the material. If there is still time left over, work on something quietly. Do not talk! Do not bother others who may still be working! Any questions?

(Instructions to subjects receiving placebo material on Day 2.)

Today, some of you will be reading about an experiment that was conducted that says a great deal about the extent to which people are willing to engage in extremely negative behavior in the name of some higher authority.

(Instructions to subjects receiving placebo material on Day 3.)

Today, a number of you will be reading an interesting article on the future of the family. Hopefully, you will find aspects of the article that will have some personal meaning.

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